American Journal of Diseases of Children

VOLUME 78 DECEMBER 1949 NUMBER 6

COPYRIGHT, 1949, BY THE AMERICAN MEDICAL ASSOCIATION

END RESULTS IN TREATMENT OF CONGENITAL HYPOTHYROIDISM

Follow-Up Study of Physical, Mental and Behavioral Development

LEO S. RADWIN, M.D.

JOSEPH P. MICHELSON, M.D.

ABRAHAM B. BERMAN, Ph.D.

AND

BENJAMIN KRAMER, M.D.

BROOKLYN

THIS paper reports the results of treatment of patients with congenital hypothyroidism over a period of thirteen to twenty-three years. Emphasis has been placed on their mental development and on their physical, behavioral, educational and socioeconomic progress.

In the treatment of a patient having a chronic disorder, an important consideration is his restoration to maximum usefulness so that he may take his proper place in society. In congenital hypothyroidism, for which specific therapy is available, it would appear that this goal should not be difficult to accomplish. As far as the patient's physical development is concerned, such a result is usually achieved. However, it is the opinion of many investigators that even after prolonged and apparently adequate treatment the mental attainments of the congenitally hypothyroid patient frequently leave much to be desired.

This view was supported by Bruch and McCune [1] who after intensive longitudinal studies on 23 children with congenital hypothyroidism found only 3 with normal intelligence quotients. They noted little correlation between mental and physical development. Applying the height quotient as an index of somatic development, they observed that although the stature of the treated hypothyroid child approached normal, his intelligence level was well below normal. They calculated a mean intelligence quotient of only 62.2 for all their patients. This quotient was not affected significantly by the age at which treatment was first instituted or by the regularity with which it was given.

From the Department of Pediatrics, the Pediatric Endocrine Clinic and the Psychology Clinic of the Jewish Hospital of Brooklyn.

1. Bruch, H., and McCune, D. J.: Mental Development of Congenitally Hypothyroid Children: Its Relationship to Physical Development and Adequacy of Treatment, Am. J. Dis. Child. **67**:205 (March) 1944.

Aldrich [2] similarly stressed the frequent incidence of mental retardation in apparently adequately treated patients with congenital hypothyroidism. He advocated giving the largest daily dose of thyroid tolerated by the patient, on the premise that it might require much more thyroid to produce mental competency than to provide normal physical growth. On the other hand, Bruch and McCune [1] pointed out that large doses of thyroid in excess of that necessary for adequate physical growth have an unfavorable effect on the patient, even to the extent of interfering with his satisfactory progress.

Goodkind and Higgins [3] in a study of 23 patients over a period of five and one-half to twenty-four years recorded intelligence quotients, ranging from 15 to 112, with a mean of 72. They noted that the lower quotients tended to occur in the patients who were short of stature and the higher ones in patients of normal height. However, they also observed several patients with normal mentality in whom statural growth had not been satisfactory. They were of the opinion that the age of the patient at the beginning of treatment did not influence his ultimate mental capacity. Six of their patients who were treated before 1 year of age remained severely retarded despite their early treatment. This unfavorable view of mental development in the treated hypothyroid patient is not a recent one. In 1910, Siegert [4] observed severe mental retardation in persons with cretinism, despite prolonged and satisfactory treatment.

On the other hand, Gesell and his co-workers [5] studied 6 female patients with congenital hypothyroidism whose condition was recognized early in infancy and treated fully. They had noted severe mental retardation before treatment in all their patients. The status of 4 of them improved under therapy, with attainment of intelligence quotients ranging between 75 and 90. No relationship could be established between the improvement in mentality and the age at which treatment was begun. Early treatment was not always most effective and delayed treatment did not preclude a favorable response.

---

2. Aldrich, C. A.: Growth and Development: The Endocrine Glands and Growth; The Thyroid, J. Pediat. **8**:381, 1936.

3. Goodkind, R. P., and Higgins, H. L.: Hypothyroidism in Infants and Children, with Reference to the Ultimate Prognosis Concerning Intelligence and to the Withdrawal of Thyroid Therapy as a Diagnostic Measure, New England J. Med. **224**:722, 1941.

4. Siegert, F.: Myxoedem im Kindesalter, Ergebn. d. inn. Med. u. Kinderh. **6**:601, 1910.

5. Gesell, A.; Amatruda, C. S., and Culotta, C. S.: Effect of Thyroid Therapy on the Mental and Physical Growth of Cretinous Infants, Am. J. Dis. Child. **52**: 1117 (Nov.) 1936.

In a follow-up study of 6 children with congenital hypothyroidism, Lazar and Nobel [6] concluded that the effect of therapy on the mental development of such patients depended on the age at onset of treatment, the intensity of the therapy and the regularity with which it was pursued. The view that early diagnosis and treatment are essential in order to achieve favorable results was also adhered to by Brown and his co-workers and Bronstein.[7] They concluded that "early recognition of the abnormal condition and active and persistent treatment thereafter are the important factors in producing ultimate mental development."

A similar view was held by Lewis,[8] but, in addition, he considered the innate mental endowment of the patient to be of even greater significance in determining the ultimate mental level. It was his opinion that adequacy of treatment was of great importance in bringing about a successful outcome, but that it was not the decisive factor. He maintained that "it was by no means impossible for those who were treated promptly and continuously to remain grossly defective." Favorable results in both physical and mental development of patients with cretinism were reported by Kerley [9] after long periods of observation.

The prevailing opinion appears to be that all gradations from idiocy to normal intelligence may be encountered in persons with this disease but that severe mental retardation may occur in spite of early and adequate treatment. Because of this apparent lack of correlation between mental capacity and adequate therapy, it is often stated that the most decisive factor in determining the success of treatment is the innate individual ability of the patient to respond. This has led to the revival of the hypothesis first advanced by Tredgold [10] that the low mental state of the person with cretinism is probably of congenital origin, that it exists in addition to the hypothyroidism and that it is, therefore, not influenced to any great extent by the administration of thyroid.

Different clinics vary in their methods of evaluating therapy. Bruch and McCune [1] used cholesterol levels as an index, while Wilkins [11]

6. Lazar, E., and Nobel, E.: Beitrag zur Prognose des kindlichen Myxoedems, Ztschr. f. Kinderh. **38**:235, 1924.

7. Brown, A. W.; Bronstein, I. P., and Kraines, R.: Hypothyroidism and Cretinism in Childhood: VI. Influence of Thyroid Therapy on Mental Growth, Am. J. Dis. Child. **57**:517 (March) 1939. Bronstein, I. P.: The Diagnosis and Prognosis of Thyroid Deficiency in Childhood, Illinois M. J. **84**:206, 1943.

8. Lewis, A.: A Study of Cretinism in London, with Especial Reference to Mental Development and Problems of Growth, Lancet **1**:1505, 1937; **2**:5, 1937.

9. Kerley, C. G.: End Results in the Cretin, Arch. Pediat. **57**:432, 1940.

10. Tredgold, A. F.: Mental Deficiency (Amentia), ed. 5, New York, William Wood & Company, 1929, p. 274.

11. Wilkins, L.: The Rates of Growth, Osseous Development and Mental Development in Cretins as a Guide to Thyroid Treatment, J. Pediat. **12**:429, 1938.

utilized bone age studies. The latter author was of the opinion that inadequacy of therapy will manifest itself within several months by a failure of progress in skeletal development and epiphysial ossification. Differences also exist in the means of foretelling the extent of mental development in persons with congenital hypothyroidism. Bruch and McCune [1] considered that the patient's "functional development before treatment supplies an index of the capacity for future mental development." Gesell and his associates [6] regarded the immediacy and extent of the patient's initial response to therapy the best index of his ultimate mental attainments. Several authors considered adequacy of therapy, the age at which it is instituted and the regularity with which it is maintained the most important factors in determining the eventual mentality. Others regarded these as of only secondary importance and stated that some other genetic factor was the deciding one. This problem, too, demands further study.

With this background of uncertainty concerning the influence of thyroid therapy on the mental growth of persons with congenital hypothyroidism, this study presents our results in the management of these patients. We have treated our patients for many years, usually from infancy through adolescence and even into adulthood. In this manner it becomes possible to evaluate the end results of thyroid therapy.

MATERIAL AND METHOD

We selected 12 congenitally hypothyroid patients, 7 male and 5 female, from our clinic to form the basis of this report, because the diagnosis of this condition had been definitely established in them. The patients all presented the characteristic physical signs and symptoms of hypothyroidism. In addition, the diagnosis was confirmed by means of appropriate laboratory procedures, including studies of bone age, determination of the basal metabolic rate in the older children during a period of thyroid withdrawal and estimations of creatine, creatinine and serum cholesterol. In 1940, we [12] emphasized the use of analyses of the total blood serum lipids and of the blood serum lipid partition in the diagnosis of congenital or acquired hypothyroidism and described the consistent elevation in total blood lipid levels which occurred in this disease. The patients described in the present study had all been given thyroid therapy before these determinations became routine in our clinic. Medication was, therefore, discontinued for a long enough period to permit a return to the hypothyroid state. Analyses which were done at this time revealed abnormally high levels of the total blood lipids and of the blood lipid fractions. Each patient, moreover, had demonstrated the characteristic favorable response of the hypothyroid person to the administration of thyroid. Withdrawal of the medicament, on the other hand, brought about a recurrence of severe symptoms, depending on the length of time treatment was discontinued.

These patients were observed for periods varying from thirteen to twenty-three years, usually since early infancy. At the time of this study, the youngest patient

12. Radwin, L. S.; Michelson, J. P.; Melnick, J., and Gottfried, S.: Blood Lipid Partition in Hypothyroidism of Childhood, Am. J. Dis. Child. **60**:1120 (Nov.) 1940.

in the series was 13 years old, having been observed since 5 months of age. The oldest was 26 years old and had been under treatment since 3½ years of age. All the patients made frequent visits to the outpatient department for periodic examinations. Laboratory studies were carried out at regular intervals in order to evaluate the effects of therapy. Desiccated thyroid was administered to each patient as soon as the diagnosis was established. Moderate doses were utilized, the average maintenance dose being 2 to 3 grains (0.12 to 0.2 Gm.) daily. In selected patients the dose was greatly increased to note the effect on the rate of improvement in the physical and mental state. As a rule, the medicament was taken regularly except for short periods when its use was discontinued to make possible laboratory studies during the hypothyroid state.

Since most disagreement regarding the efficacy of thyroid therapy in the congenitally athyreotic child is related to his ultimate mental attainments, social status and economic self sufficiency, these aspects of the problem are emphasized in this report. The mental status of each patient had been tested as soon as feasible after therapy was started. Psychometric studies were made at repeated intervals thereafter during the period of observation. A variety of testing programs was employed, notably the Terman 1916 Stanford Revision of the Binet-Simon Test,[13] the Terman-Merrill Revised Stanford-Binet Intelligence Scale, Forms L and M, the Wechsler-Bellevue Intelligence Scale for Adults and Adolescents, the Kuhlmann Tests of Mental Development and the Gesell Developmental Schedule. The last test was used for only 1 child. The most recent evaluation of the mental status was limited to the use of the Wechsler-Bellevue Intelligence Scale for Adolescents and Adults, Form I, and the Terman-Merrill Revised Stanford-Binet Intelligence Scale, Form L.

To supplement our study of these 12 patients, we were privileged recently to study 4 young children with clinically demonstrated congenital hypothyroidism. These children, 3 girls and 1 boy, ranged in age from 2 years 3 months to 6 years 7 months. Their mentality had been tested either at the onset of treatment or shortly thereafter. The opportunity seemed favorable to determine the rapidity and extent of immediate mental growth in response to adequate thyroid therapy. The children were, therefore, retested, using the Terman-Merrill tests, Forms L and M, and the Kuhlmann Tests of Mental Development, and a comparison was made with the results of their previous examinations. These initial and later tests all were given by one of us. In our original group of 12 persons with cretinism there were 4 patients who also had been consecutively tested at short intervals and at an early age. It was, therefore, possible to incorporate our findings in this group with those in the 4 young children studied recently and to evaluate them together. The advantage of this procedure lies in the fact that the 4 older children were followed into later life, and their present mental state is known. In this way an approximate idea could be obtained of how permanent the immediate response to therapy proved to be.

13. The correlation of intelligence quotients between the original Stanford-Binet (1916) test and Form L is 0.925 (Terman, L. M., and Merrill, M. A.: Measuring Intelligence: A Guide to the Administration of the New Revised Stanford-Binet Tests of Intelligence, Boston, Houghton Mifflin Company, 1937, p. 51). The correlation of quotients between the Stanford-Binet (1937) test, Revised Form L, and the Wechsler-Bellevue Scale from the results obtained by testing 55 male and female patients 12 to 24 years of age from a mental hygiene clinic showed $r = 0.91 \pm 0.02$ (Wechsler, D.: Measurement of Adult Intelligence, ed. 3, Baltimore, Williams & Wilkins Company, 1944, p. 134).

The state of a patient's physical development was determined by comparing his physical progress during the years with the expected development for a normal child his age and sex. The height and weight, body build and degree of sexual maturation noted at the time of the last mental examination were taken as indexes of present physical development. Several representative cases are presented in detail to illustrate different facets of the problem.

Case 1.—S. R., a 17 month old white girl, was first admitted to the clinic on Nov. 2, 1931 because of delayed mental and physical development. She had been unable to hold her head up until 1 year of age. On her admission she was still unable to sit without support. Her first tooth had not yet erupted. Her mother admitted that the child was mentally below average. The patient was 28 inches (71 cm.) tall and weighed 19 pounds 5 ounces (8,760 Gm.). The anterior fontanel was still open. The hair was coarse and the skin dry. Her tongue was large. The serum cholesterol level was 415 mg. per hundred cubic centimeters. Comparison with the Gesell Developmental Schedule revealed poor motor development and mental retardation to a 9 month level. A diagnosis of congenital hypothyroidism was made, and administration of thyroid U. S. P. was started immediately in doses of ¼ grain (15 mg.) twice a day, which was soon increased to 1 grain (60 mg.) three times daily.

When she was 2½ years old, another comparison with the Gesell Schedule showed considerable improvement in her mental state and she appeared to have reached a 2 year level. Her teeth erupted quickly and by 20 months of age she had eight of them. Ossification of the centers at the wrist and elbow became normal. However, she remained somewhat below normal mentally. Physical development compared favorably with the normal for her age. At 5 years 9 months, she showed a mental age of 5 years and her intelligence quotient was 87. The impression of the examiner was that she showed a decided lag in her verbal answers at first, but when given time she responded correctly. She was slow in group activity, restless in school and slower mentally than the other children.

In December 1936, therapy was discontinued for a period of ten weeks. During this time she showed symptoms of hypothyroidism; her skin became rough again; she manifested pallor and became lethargic and listless. Her basal metabolic rate was —34 per cent; serum cholesterol was 576 mg. per hundred cubic centimeters. Therapy was resumed and her symptoms disappeared, but the serum cholesterol level remained high (594 and 408 mg. per hundred cubic centimeters). These high levels may possibly be explained by the fact that the medicament was not taken regularly because of lack of cooperation on the part of her mother.

She continued taking thyroid irregularly until 1939, when its use was discontinued temporarily for serum lipid studies. After five weeks without medication, the total serum lipids were 1,531 mg., with 431 mg. of total cholesterol, 136 mg. of free cholesterol and 10 mg. of lipid phosphorus per hundred cubic centimeters. These values are all well above normal. After medication was resumed, the total serum lipids fell to 440 mg. and the other lipid fractions also became normal. Her physical development was satisfactory. On May 25, 1948 at 18 years of age, she weighed 109 pounds (49.4 Kg.) and was 61 inches (155 cm.) tall. All her epiphyses had fused. Skeletal maturation had been advanced for her age, so that she had prematurely reached an 18 year bone age by 14 years. Menarche had appeared as usual and her menses were normal. A psychometric study at this time, with the use of the Terman-Merrill revised Stanford-Binet, Form L, and the Wechsler-Bellevue intelligence testing programs, revealed an intelligence quotient of 82. She gave the impression of dull normal intelligence, showing little evidence of thinking through a problem. She was lazy, wilful, obstinate and

lacking in self confidence. She had been employed in a five-and-ten cent store but gave up her job because she was afraid of handling money. She had a steady boy friend who was seriously interested in her. In September 1948, she acquired severe poliomyelitis and has been hospitalized since.

This patient represents a case of congenital hypothyroidism with decided physical and mental retardation before therapy. Treatment was started at 17 months of age and was administered irregularly. Nevertheless, by the time adolescence was complete, the patient had qualified as a dull normal person with an intelligence quotient of 82. Her case is illustrative of those of other patients in our series who evidenced pronounced physical and mental retardation before treatment and who eventually attained a satisfactory mental, physical and socio-economic status.

CASE 2.—I. S., a white female child 9 months of age, was admitted to the clinic on Aug. 13, 1936, with a history of normal development to the age of 4 months, when she began to eat poorly and to lose weight. She had just begun to hold her head up but could not sit without support. When she was 5 months old, a diagnosis of hypothyroidism had been made and administration of thyroid, ¼ grain daily, was prescribed.

She weighed 13 pounds 9 ounces (6,152 Gm.). A roentgenogram of the wrists revealed one small center of ossification. While she was taking thyroid, the serum cholesterol level was 200 mg. per hundred cubic centimeters. The dose of thyroid was increased gradually to 3 grains (0.2 Gm.) daily with immediate response. She became much brighter and was able to sit well. Her teeth erupted normally and by 14 months of age she began to talk. Ossification of the centers at the wrist and elbow developed rapidly and was even advanced for her age. At 3 years of age, administration of thyroid was discontinued for six weeks, resulting in a return of symptoms of hypothyroidism, accompanied with a rise in serum cholesterol to 458 mg. per hundred cubic centimeters and electrocardiographic evidence of myocardial damage.

At 4 years of age, she weighed 35½ pounds (16.1 Kg.) and was 39¼ inches (100 cm.) tall. Blood lipid studies while she was receiving thyroid revealed a total serum lipid level of 660 mg.; total cholesterol was 167 mg., free cholesterol 60.5 mg. and lipid phosphorus 5.3 mg., per hundred cubic centimeters. Several months later, after use of thyroid had again been discontinued for five and a half weeks, these levels rose so that the concentration of total lipids was 1,347 mg., and total cholesterol measured 433 mg., free cholesterol 112 mg. and lipid phosphorus 12.2 mg., per hundred cubic centimeters.

At 4 years 4 months of age, the Terman-Merrill revision of the Stanford-Binet test revealed an intelligence quotient of 62. The child was talkative, voluble and easily distracted and, at times, gave irrelevant replies to questions. Ten months later, the intelligence quotient was still 63, with the use of the same testing program.

At 6 years of age, her intelligence quotient was 61, classifying her as a moron. She was nervous, talkative and restless and had nocturnal enuresis. In school her work was poor even for an ungraded class. Her attitude in school was so detrimental to the rest of the pupils that her suspension was considered by the authorities. When her daily intake of thyroid was reduced from 3 grains to 1 grain, she became more quiet and cooperative and her school work improved.

Her physical progress was normal. At 9 years, she weighed 60 pounds (27.2 Kg.) and was 51¾ inches (131.5 cm.) tall; ossification at the wrist and elbow was advanced beyond the average for her age. She was taking thyroid regularly without interruption and in adequate amounts. At 13 years 2 months of age, she was 54½ inches (138 cm.) tall and weighed 78 pounds (35.4 Kg.). Menarche appeared at 12 years. There were a normal amount of sexual hair and normal breast development. She was in a special class at school because, to use her own words, "I am slow at my work, at figuring things out, at taking off my coat and putting things away where they belong." Skeletal maturation was still in an advanced state for her age. At that time, a psychometric examination, with the use of the Terman-Merrill revised Stanford-Binet, Form L, testing program, revealed a mental age of 10 years 10 months, giving her an intelligence quotient of 83. She employed a vocabulary equal to that of the average adult. Her specific weaknesses were in subtests involving visual motor concepts, memory for digits backward and forward and recognition of absurdities presented pictorially and verbally. Her comprehension was on a 13 year level. She excelled in reading and in spelling but was poor in arithmetic. It was the examiner's opinion that she was of low normal intelligence, having made definite improvement in her mental status. She talked with slow scanning speech and with peculiar mannerisms which bespoke lack of normalcy, despite her intelligence quotient of 83. She enjoyed associating with other children and had joined a Girl Scout group.

This patient demonstrates a persistence of mental retardation for years despite the early introduction of therapy, adequate regular administration of thyroid and the absence of early signs of severe retardation. Her mother was a normally intelligent woman who devoted herself to her child. During the last four years, the child has progressed from a state of mental deficiency, indicated by an intelligence quotient of 61, to the relatively normal intelligence which she now commands. Thus, the intelligence level cannot be considered stationary in patients with cretinism, for improvement is possible even after years of adequate therapy. The daily dose of thyroid was reduced from 3 grains to 1, resulting in a diminution in her restlessness and a greater degree of placidity. Bruch and McCune contended that excessive doses of thyroid may actually cause a lowering of the intelligence level as measured by psychometric studies.[1]

CASE 3.—A. F., a white girl, was admitted to the clinic on Nov. 17, 1931 at the age of 7½ years with the chief complaint of stunted growth. There was a history of apparently normal physical and mental development until she was 1 year old, when she contracted severe whooping cough which lasted for three months. She then grew sluggish and inactive. Her skin became dry and her hair coarse. She did not begin to walk until she was 3½ years old. It was not clear in her mother's mind whether some of these symptoms had been present in mild form during the first year before her illness. She did not grow well and her general physical development was retarded. At 7½ years of age, she weighed 34¾ pounds (15.7 Kg.) and was only 34 inches (86 cm.) tall. She had received no therapy for her lack of development prior to her admission. At that time she appeared to be a typical hypothyroid dwarf. She was slow and lethargic. The anterior fontanel was still open. She had 20 deciduous teeth, but no permanent teeth had yet erupted. She had a full, prominent abdomen with

an umbilical hernia. Ossification of the carpal and tarsal bones was delayed to about the 2 year level. A determination of basal metabolic rate was attempted but could not be completed successfully owing to lack of cooperation. Treatment with thyroid was begun in doses of 1 to 2 grains (0.06 to 0.12 Gm.) daily, and a decided clinical improvement was noted almost immediately. She appeared brighter and more interested in her surroundings. Permanent teeth began to erupt and her ability to walk improved.

When she was 8 years old, after about six months of therapy, a psychometric examination showed that "she had not developed far enough to comprehend the requirements of the Binet-Simon test." The administration of thyroid was continued at 1 to 2 grains daily, but she neglected to take her medicament for weeks at a time. New centers of ossification appeared at the wrist in spite of this irregular therapy, but at 9 years skeletal development was still below normal for her age. While she was taking thyroid, the blood cholesterol level was 238 mg. per hundred cubic centimeters. During the next year her visits to the clinic became infrequent. In October 1934, at 10½ years of age her intelligence quotient was 39. A psychometric test repeated six months later indicated a quotient of 41. At this time a roentgenogram demonstrated normal ossification of the centers at the wrist, with no evidence of delay. At 12½ years of age, another study revealed an intelligence quotient of 42, classifying her as a high grade imbecile with no educational attainments and unsuited for even an ungraded class in school. Her attendance at the clinic and her acceptance of medication remained irregular until September 1938. At this time the dose of thyroid was increased to 6 grains (0.39 Gm.) a day in an attempt to improve her intellectual state, if possible. She lost weight and tachycardia developed, so that the dosage was reduced to 4 grains (0.26 Gm.) a day; this was continued for about two years. There was no improvement in her condition, and the only effect was to superimpose a nervous restlessness on her already defective mentality.

Her physical growth progressed at a slow but satisfactory rate, so that at 15 years of age she weighed 93 pounds (42.2 Kg.) and was 58¼ inches (148 cm.) tall. Menarche set in when she was 14 years 8 months old. By the time she was 16, menses were regular and normal. In December 1939, thyroid was withheld for a period of five weeks, after which time a blood lipid analysis revealed the following levels, all of which are higher than normal: Total lipids measured 990 mg., with 337 mg. of total cholesterol, 83.3 mg. of free cholesterol and 10 mg. of lipid phosphorus, per hundred cubic centimeters. When thyroid therapy was resumed, these levels all returned to normal within several weeks.

At 18 years of age, she was 59¼ inches (150.5 cm.) tall and weighed 109¼ pounds (49.5 Kg.). At the time of the present study at 24½ years of age, her weight was 120 pounds (54.4 Kg.) and her height 62 inches (158 cm.).

A determination of intelligence level was recently attempted at her home, but her low mental status and concomitant behavior precluded direct testing. She had refused to come to the hospital for the psychometric examination, and when the examiner visited her at home she ran away and hid in the cellar. The mother revealed that the patient had been in an ungraded class until the age of 14 years. She had then remained at home helping with the household chores. She cannot read or write. She is not trusted with money because she cannot compute the simplest arithmetic problems. She is not permitted to travel alone. Friends take her to parties where she participates in social activities, such as dancing. She plays the piano "by ear." From these data and other observations, the examiner inferred that her intelligence was probably not above the previous level indicated by the quotient of 42 and that the patient should still be classed as feebleminded.

This child represents a case of congenital hypothyroidism untreated until late (7½ years of age) and treated irregularly thereafter. Improvement occurred immediately after the institution of therapy and ossification of carpal centers proceeded to a normal state within a relatively short time, even though treatment was insufficient. However, the patient's mental status was not appreciably improved beyond the low level indicated by the initial psychometric test, which was performed three years after the onset of therapy. Our experience with this child and with others in this study indicates that in persons treated for hypothyroidism, physical growth and skeletal maturation proceed at a rate well in advance of mental development. Since skeletal development progressed normally in spite of insufficient and irregular therapy, it would seem that this is not always a satisfactory index of adequacy of treatment. It is questionable whether the ultimate mental development of this patient would have been much altered by more intensive treatment. When the daily dose of thyroid was increased and the increased dose taken regularly for two years, there was no improvement in mental state. Instead, her irritability and restlessness became more pronounced. It is by no means certain that late recognition and inadequate therapy were the only causes for the poor results. Other children in whom treatment was started late or who were treated insufficiently have made better progress. Some, on the other hand, have remained retarded mentally even when treated early and well.

CASE 4.—G. C., a white boy, was admitted to the clinic in January 1932 at 15 months of age. He had been treated for congenital hypothyroidism since the age of 4 weeks with 1½ to 2 grains (0.09 to 0.13 Gm.) of thyroid daily. Psychometric evaluation at 18 months revealed a mental level of 10 to 11 months. He was not seen again at the clinic until he was 6 years 4 months old. He had been under the care of his private physician and had been taking 2 grains of thyroid daily. His physical development was normal. His serum cholesterol level was 241 mg. per hundred cubic centimeters. The basal metabolic rate was + 1 per cent. A roentgenogram of his wrists showed slight delay in ossification of the carpal centers. Administration of thyroid was discontinued for a period of seven weeks for purposes of investigation. He began to gain weight and to grow sluggish. The basal metabolic rate dropped to — 45 per cent. The serum cholesterol level rose to 846 mg. per hundred cubic centimeters. Thyroid medication was resumed, whereupon the cholesterol level gradually fell to 218 mg. per hundred cubic centimeters and the basal metabolic rate became + 3 per cent. A psychometric evaluation at this time revealed an intelligence quotient of 103.

On May 7, 1940, a serum lipid analysis done while the patient was taking thyroid revealed the following levels, all of which are normal: total lipids 717 mg., total cholesterol 245 mg., free cholesterol 56 mg. and lipid phosphorus 7.5 mg., per hundred cubic centimeters.

At repeated intervals, analyses of the serum lipids while the patient was receiving medication continued to reveal normal levels. The intelligence quotient on May 18, 1943, at 12½ years of age, was 98. Skeletal ossification at the wrist

was now normal and remained so at successive age levels. He continued to take thyroid regularly, in doses averaging 3 grains daily. At 17½ years of age, he was in the sixth term of a vocational high school. Puberal changes had come on normally. At 18 years, he weighed 121 pounds (54.9 Kg.) was 68 inches (173 cm.) tall and had no gross physical defects.

A mental test at this time, with the use of the Wechsler-Bellevue Intelligence Scale for Adults revealed a quotient of 100. During the examination, he was excessively voluble and happy and smiled almost continuously. He showed greater facility in using words and symbols than in manipulating objects or in perceiving visual patterns. He excelled in vocabulary but did not do as well in arithmetic. He gave a picture of average or normal intelligence.

This case provides an example of a boy adequately treated early in life (beginning at 4 weeks of age) for congenital hypothyroidism. Thyroid therapy was responsible for a completely normal physical development and an apparently normal mental state. This case could conceivably be used to illustrate the advantages of early and adequate therapy in this disease. However, other factors must be involved, because equally early and competent therapy has failed to produce as favorable results in other patients.

RESULTS

In table 1 the effect of prolonged thyroid therapy on the physical and skeletal maturation of patients with congenital hypothyroidism is described. The physical development of these patients compared favorably with that of the average child. Body growth was satisfactory, and sexual maturity came on without any evidence of delay. Stature was within the expected range in all patients. However, 2 of the female patients (H. N. and I. S.) attained only the lowest limit of normal height, despite regular and adequate treatment. In these 2 thyroid therapy was started at the age of 5 months and 14 months, respectively. The more pronounced growth lag occurred in the child whose treatment was started earlier. Both children in our series who had been irregularly treated (A. F. and S. R.) nevertheless attained normal stature. Five children who were not given thyroid until 1½ to 7½ years of age all achieved average height.

Skeletal maturation, based on Todd's standards,[14] became normal in all but 1 patient (W. S.) within a short time after onset of therapy and thereafter kept pace with the chronologic age. In this patient normal skeletal development was not attained until eight years after onset of therapy. Nevertheless, statural growth was normal. Therapy was started early and was regularly administered.

14. Todd, T. W., and others: Atlas of Skeletal Maturation, St. Louis, C. V. Mosby Company, 1937.

In table 2 is presented the effect of thyroid therapy on the mental development of 12 patients with congenital hypothyroidism. The mental status, as measured by the intelligence quotient, was found to be within the normal range in a larger number of patients than expected.

TABLE 1.—*Effect of Thyroid Therapy on Physical Development and Skeletal Maturation of Patients with Congenital Hypothyroidism*

Patient	Present Age Yr.	Present Age Mo.	Sex	Age at Onset of Therapy Yr.	Age at Onset of Therapy Mo.	Regularity of Therapy	Dosage	Height, In.	Physical Development	Bone Age	Sexual Maturation	Relation of Therapy to Physical Development
M. S.	18	4	M	2	11	Regular	Adequate	65¼	Normal	Normal	Normal	Positive
H. N.	15	8	F	..	14	Regular	Adequate	57	Normal	Normal	Normal	Positive
M. B.	18	9	M	..	17	Regular	Adequate	64	Normal	Normal	Normal	Positive
L. E.	24	10	M	..	5½	Regular	Adequate	68½	Normal	Normal	Normal	Positive
A. A.	16	..	M	..	8	Regular	Adequate	70	Normal	Normal	Normal	Positive
A. D.	26	..	F	3	6	Regular	Adequate	61	Normal	Normal	Normal	Positive
I. S.	13	..	F	..	5	Regular	Adequate	54¼	Normal	Normal	Normal	Positive
S. R.	18	6	F	..	17	Irregular	Adequate	61	Normal	Normal	Normal	Negative
A. F.	24	7	F	7	6	Irregular	Inadequate	64	Normal	Normal	Normal	Negative
G. C.	18	2	M	4 weeks		Regular	Adequate	68	Normal	Normal	Normal	Positive
W. S.	21	2	M	..	18	Regular	Adequate	69	Normal	Normal	Normal	Positive
C. S.	14	6	M	..	3	Regular	Adequate	60½	Normal	Normal	Normal	Positive

TABLE 2.—*Effect of Thyroid Therapy on Mental Development of Patients with Congenital Hypothyroidism*

Patient	Present Age Yr.	Present Age Mo.	Sex	Age at Onset of Therapy Yr.	Age at Onset of Therapy Mo.	Regularity of Therapy	Dosage	Intelligence Quotient (Terminal)	Relation of Adequacy of Therapy to Intelligence Quotient
M. S.	18	4	M	2	11	Regular	Adequate	90	Positive
H. N.	15	8	F	..	14	Regular	Adequate	57	Negative
M. B.	18	9	M	..	17	Regular	Adequate	77	Positive
L. E.	24	10	M	..	5½	Regular	Adequate	77	Positive
A. A.	16	..	M	..	8	Regular	Adequate	86	Positive
A. D.	26	..	F	3	6	Regular	Adequate	67	Negative
I. S.	13	..	F	..	5	Regular	Adequate	83	Positive
S. R.	18	6	F	..	17	Irregular	Adequate	82	Negative
G. C.	18	2	M	4 weeks		Regular	Adequate	100	Positive
A. F.	24	7	F	7	6	Irregular	Inadequate	42	Positive
W. S.	21	2	M	..	18	Regular	Adequate	98	Positive
C. S.	14	6	M	..	3	Regular	Adequate	103	Positive

In 7 of the 12 patients the intelligence quotient ranged from 82 to 103. In 2 others, it was 77. The latter level represents a state of borderline deficiency, despite which the patient can take his place as a competent member of society. Both these patients attended school until 16 and 17 years of age and are now satisfactorily employed. In the remaining 3 patients, the intelligence quotients were 42, 57 and 67, respectively.

In 3 of the patients there appeared to be no relationship between the adequacy of therapy and the terminal intelligence quotient. In 1 of them, this was manifested by the favorable result in spite of poor therapy, in the other 2 by the poor result despite adequate and early treatment. In 8 others the treatment had been adequate and the patients did well. In the twelfth, treatment was irregular and the terminal intelligence quotient was low.

Table 3 presents a comparison of the initial intelligence quotients of these patients with congenital hypothyroidism taken after the onset of treatment, with the levels determined at the time of the present study.

In 7 patients a significant variation between the initial and terminal intelligence quotients was recorded. Each patient had progressed from

TABLE 3.—*Comparison of Initial and Terminal Intelligence Quotients of Patients with Congenital Hypothyroidism Treated Through Adolescence and Adulthood*

Patient	Sex	Age at Which Treatment Was Started		Age at Initial Psychometric Test		Testing Program; Intelligence Quotient	Age at Terminal Psychometric Test		Testing Program; Intelligence Quotient	Time Range Between Psychometric Tests		Variations in Intelligence Quotient
		Yr.	Mo.	Yr.	Mo.		Yr.	Mo.		Yr.	Mo.	
A. A.	M	..	8	6	5	Terman-Merrill, Form L; 94	16	..	Wechsler-Bellevue, Form I; 86	9	7	— 8
M. B.	M	1	5	11	11	Terman-Merrill, Form L; 69	18	4	Wechsler-Bellevue, Form I; 77	6	5	+ 8
G. C.	M	..	1	12	7	Terman-Merrill, Form L; 98	17	9	Wechsler-Bellevue, Form I; 100	5	2	+ 2
A. D.	F	3	6	13	..	Terman (1916); 52	26	..	Wechsler-Bellevue, Form I; 67	13	..	+15
L. E.	M	..	5½	8	4	Terman (1916); 56	24	5	Wechsler-Bellevue, Form I; 77	16	1	+21
A. F.	F	7	6	10	5	Terman (1916); 39	12	7	Terman (1916); 42	2	2	+ 3
							24	8	(Estimated to be same)	14	3	
H. N.	F	1	2	8	..	Terman-Merrill, Form L; 69	15	3	Terman-Merrill, Form L; 57	7	3	—12
S. R.	F	1	5	1	5	Gesell Developmental Schedule; 8 mo. level	14	8	Terman-Merrill, Form L; 82	13	3	+32
M. S.	M	2	11	9	4	Terman-Merrill, Form L; 77	18	4	Wechsler-Bellevue, Form I; 90	9	..	+13
C. S.	M	..	3	5	9	Terman-Merrill, Form L; 93	14	5	Wechsler-Bellevue, Form I; 103	8	8	+10
W. S.	M	1	..	8	5	Terman (1916); 86	21	..	Wechsler-Bellevue, Form I; 98	12	7	+12
I. S.	F	..	5	4	4	Terman-Merrill, Form L; 62	13	2	Terman-Merrill, Form L; 83	8	10	+21

a lower to a higher classification of intelligence. Another patient (M. B.) improved his quotient 8 units, raising himself from definite feeblemindedness to borderline deficiency. Two patients maintained their levels. Concomitant with intellectual growth in these patients, considerable improvement was noted in their social behavior and educational progress. This was evident even in those who had demonstrated a normal intelligence quotient in their initial psychometry. Two patients retrogressed in their mental status, as indicated by a negative variation in intelligence quotient of 8 and 12 units, respectively.

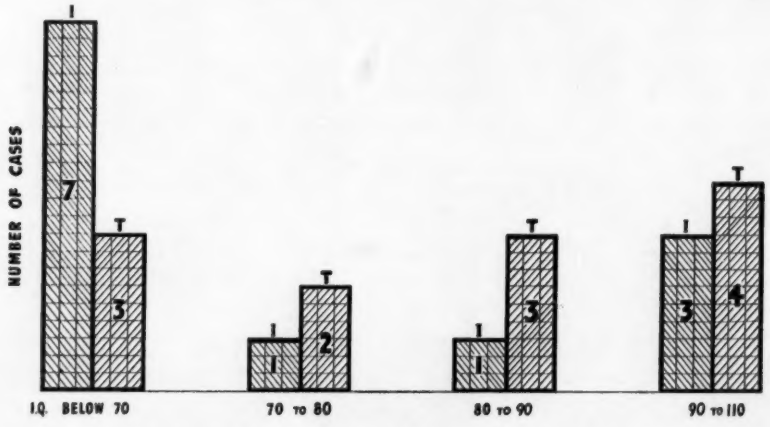
The positive variations in the initial and terminal quotients of patients treated for congenital hypothyroidism is particularly significant, since at the time of the initial tests 11 of the 12 patients had already been under treatment for periods ranging from two years eleven months to twelve years six months. After such a period, the intelligence quotient of the treated patient is considered to have become stabilized.[5]

Nevertheless, in two thirds of our series continued treatment effected further positive and significant variation in the intelligence quotient.

The degree of change in the quotient of the patients tested becomes even more apparent when they are classified in accordance with the Terman [15] scale of intellectual categories as described in table 4 and the figure. On the basis of their initial quotients, 7 of the patients were classified as feebleminded, whereas, on the basis of their terminal quotients, only 3 remained within this category.

TABLE 4.—*Classification of Initial and Terminal Intelligence Quotients of Patients with Congenital Hypothyroidism*

Terman Classification		Number of Patients	
Range of Intelligence Quotients	Category	Initial Intelligence Quotient	Terminal Intelligence Quotient
Below 70	Definite feeblemindedness	7	3
70 to 80	Borderline deficiency	1	2
80 to 90	Dulness	1	3
90 to 100	Normal or average intelligence	3	4



Graph showing comparison between initial (*I*) and terminal (*T*) intelligence quotients in present series.

The initial intelligence quotient of 1 of these 3 (A. D.) was 52 (on the Terman 1916 revision) and her most recent one was 67 (on the Wechsler-Bellevue scale). Such positive variation over a period of thirteen years may be considered a distinct improvement in intellectual status. The patient was employed in a factory at a routine job, appeared to be socially adjusted and was economically self sufficient. Thus she may be classified as defective intellectually but not feebleminded socially. The second patient (A. F.) made no improve-

15. Terman, L. M.: The Measurement of Intelligence, Boston, Houghton Mifflin Company, 1916, p. 79.

ment in her mental status. She did not learn to read or write. She participated in the family routine and helped her mother with household chores. The third patient (H. N.) showed a regression in her mental status from an intelligence quotient of 69 to one of 57 (on the Terman-Merrill revision, Form L). Within her limited intellectual status she made satisfactory social and scholastic adjustments. At the time of this study, she attended a vocational high school and was pursuing a course in beauty culture.

Two other patients, on the basis of their terminal intelligence quotients, were classified as of borderline deficiency. Both of them evidenced great improvement from their initial quotients. In 1 (M. B.), the level rose from 69 to 77 and in the other (L. E.) from 56 to 77 (table 3). Thus, from a classification of definite feeblemindedness they

TABLE 5.—*Follow-Up Study of Intelligence Quotients of Children with Congenital Hypothyroidism*

Patient	Sex	Age at Which Treatment Started	Age at Initial Psychometric Test		Testing Program; Intelligence Quotient	Age at Follow-Up Study		Testing Program; Intelligence Quotient	Time Range Between Psychometric Tests		Variations in Intelligence Quotient
			Yr.	Mo.		Yr.	Mo.		Yr.	Mo.	
F. B.	F	5 mo. 1 day	5 mo. 9 days		Kuhlmann; no response	2	8	Kuhlmann; 70	1	10	+70
A. C.	F	8 mo.	5	1	Terman-Merrill, Form L; 98	5	11	Terman-Merrill, Form L; 107	..	10	+ 9
A. F.	F	7 yr. 6 mo.	10	5	Terman (1916); 39	12	7	Terman (1916); 42	2	2	+ 3
S. R.	F	1 yr. 5 mo.	1	5	Kuhlmann; 50	2	8	Kuhlmann; 75	1	3	+25
B. S.	M	6 weeks	1	6	Kuhlmann; 52	4	3	Terman-Merrill, Form M; 82	2	9	+30
C. S.	M	3 mo.	5	9	Terman-Merrill, Form L; 93	8	7	Terman-Merrill, Form L; 103	2	10	+10
I. Sm.	F	8 mo.	4	7	Terman-Merrill, Form L; 76	5	8	Terman-Merrill, Form L; 86	1	1	+10
I. So.	F	5 mo.	4	4	Terman-Merrill, Form L; 62	5	11	Terman-Merrill, Form M; 61	1	7	— 1

progressed to a higher mental range. They were employed at the time of study and were socially well adjusted.

The remaining 7 patients fell within the categories of dull normal or of normal intelligence. Three of them previously classified as feebleminded had improved intellectually to such an extent that they were within the dull normal to normal range of intelligence. Of the 4 who were initially in the dull normal to normal group, 2 made significant progress, improving their intelligence quotients 10 and 12 units, respectively. One of the 4 retrogressed 8 units, going from the normal to the dull normal classification. The fourth showed a slight positive variation in his quotient, remaining in the normal group.

In table 5 is presented a study of 8 children who were retested within a period of less than three years after their initial psychometric examination. This was done in order to evaluate the rapidity, as well as the extent, of improvement consequent to thyroid therapy. Since 4 of these patients were already followed to maturity, it was possible to determine whether this initial benefit was maintained or even increased in later life.

Two children (F. B. and S. R.) were tested as soon as a definitive diagnosis of congenital hypothyroidism was established. The Kuhlmann Tests of Mental Development were administered. Patient F. B. was examined at 5 months 9 days of age, or eight days after the onset of treatment. At this time she gave little evidence of mental awareness or of neuromuscular development. During the examination she maintained a fixed position and failed to respond to auditory or visual stimuli. She was unable to sit, even with support. One year ten months later she was retested, revealing an intelligence quotient of 70.

TABLE 6.—*Educational and Socioeconomic Adjustment of Patients Treated for Congenital Hypothyroidism*

Patient	Age Yr.	Age Mo.	Sex	Schooling	Occupation	Social Status
A. A.	16	..	M	High school-commercial course	Student	Gets along well with associates; plays on soccer team
M. B.	18	9	M	Left high school in 1st term at 17 yr.	Delivery boy in fruit store; earns $25 to $35 weekly	Socially well adjusted; cheerful, friendly
G. O.	18	2	M	In 6th yr. of vocational high school at 17½ yr.	Studies photography; part time head usher in theater at $22 per week	Happy, cheerful; has many friends of both sexes
A. D.	26	..	F	Graduated from junior high school	Employed in factory at routine task	Presentable appearance; shy; occasional social contacts
L. E.	24	10	M	Ungraded class to age of 16 yr.	Shipping clerk; errand boy	Actively interested in photography and music; has evidenced antisocial tendencies
A. F.	24	7	F	Ungraded class to age of 14 yr.	At home; helps in household chores	Low grade moron
H. N.	15	8	F	Vocational high school	Student	Variety of unsustained interests; pleasant, affable
M. S.	18	4	M	Junior high school graduate	Partially self supporting; several jobs for short periods; unemployed at present	Dull appearance; friendly; good social adjustment
C. S.	14	6	M	In grade 9A of junior high school	Student	Normal
W. S.	21	2	M	Junior high school graduate	At trade school learning to operate paper cutting machine and earning $22 per week at same time	Aware of his own inadequacies; resents the type of school he attends; not friendly
I. S.	13	1	F	Ungraded class; being transferred to regular class	Student	Garrulous; prefers younger friends; Girl Scout
S. R.	18	6	F	Left high school after 3d term at 17 yr.	Clerk in 5 and 10c store; left because afraid to handle money	Attractive appearance; engaged to be married

She walked without falling and avoided obstacles. Her speech was satisfactory for her age.

Patient S. R. was tested with the Kuhlmann program at 1 year 5 months of age, on the day her condition was diagnosed as congenital hypothyroidism. Her intelligence quotient at this time was 50. At 2 years 8 months of age, one year three months after treatment was started, she was again examined with the Kuhlmann tests, this time establishing a quotient of 75. There had been decided acceleration in her mental development.

Patient A. F. was first treated at the late age of 7 years 6 months. The intelligence quotient (on the Terman 1916 revision) obtained two

years eleven months later was 39. The quotient on follow-up study established two years two months after the administration of the first testing program was 42, indicating little, if any, improvement in her mental status.

In 2 patients, A. C. and C. S., the intelligence quotients initially obtained, after a period of more than five years of treatment, were 98 and 93, respectively. When these 2 children were retested—ten months and two years ten months later—their intelligence levels had been maintained within the normal range.

Patient B. S. was examined with the Kuhlmann Tests of Mental Development one year six months after treatment was started. His intelligence quotient was 52. Two years nine months later, he disclosed a quotient of 82 (on the Terman-Merrill revision, Form M), demonstrating a decided acceleration in mental development.

Patient I. Sm. showed a significant increase in her intelligence quotient, from 76 to 86, during an interval of one year one month between psychometric examinations, while I. So. showed no mental improvement during a comparable interval.

Thus, in 6 of the 8 patients studied there was considerable improvement in mental status over a period of time varying from ten months to two years ten months. In only 2 patients was there no change in the previously low mental status.

Three of the patients tested showed definite improvement between the initial and second testing program. The initial psychometric test had been administered to them either at the onset of treatment or soon thereafter. As a result, the difference between the low initial mental state and the early improvement under therapy appeared to be extensive. In those in whom longer periods had elapsed between the beginning of treatment and the initial intelligence test, the difference between results on this psychometric test and on the second test was much less striking. In the light of our experience with the other 3 patients, it seems likely that much of the improvement had already taken place before the testing program was initiated.

An estimate of the degree of success with which the patient with congenital hypothyroidism is able to achieve satisfactory social, economic and educational adjustment is described in table 6. Only 2 patients attended the ungraded class and failed to reach the high school level. With the exception of 1 patient, all the others were, at the time of the present study, either attending school or employed. However, their employment was limited to routine or unskilled work. Despite their original handicaps, the patients had, for the most part, made satisfactory social adjustments.

COMMENT

The physical appearance, statural growth, skeletal maturation and sexual development of our patients conformed with the expected attainments of the average adolescent or young adult. Variations in stature apparently followed the hereditary or familial characteristics of the individual patient. In our experience there was no conclusive correlation among the growth pattern of the patient treated for congenital hypothyroidism and the adequacy of treatment, the age at which treatment was instituted or the severity of the disease. Well treated children proved to be short adults, and irregular treatment did not prevent the attainment of normal stature. The greatest growth lag occurred in 1 of our earliest treated patients who took thyroid in adequate doses and at regular intervals. In 1 of the 2 patients who were short in stature, there nevertheless were normal mentality and sexual maturity.

After one to two years of treatment, only 1 of our patients evidenced delay in skeletal development. This patient did not attain normal skeletal maturation for eight years in spite of adequate and regular treatment. In several patients bone age was even advanced over chronologic age. It was, therefore, not possible to utilize skeletal development as an index of the adequacy of therapy, since skeletal maturation did not parallel mental development.

The mental level attained by most of our patients was higher than that described for the patients treated in other clinics. In 7 of the 12 patients normal intelligence developed, the quotient ranging from 82 to 103. Two others reached an intelligence quotient of 77. The latter belong to the intermediate group with borderline deficiency. Although intellectually somewhat below the average cross section of population, the patients have, nevertheless, proved to be useful, functioning persons. They hold positions which enable them to provide for themselves. Three of the 4 children studied for early effects of thyroid therapy also showed normal intelligence, with quotients of 82, 86 and 107 attained after comparatively short periods of treatment. The fourth, with a quotient of 70 less than two years after initiation of therapy, is classed as of borderline deficient mentality. Three of the 12 patients studied to maturity were definitely mentally retarded.

The entire intellectual gain of the patient treated for congenital hypothyroidism was said to be accomplished within the first two to three years after the introduction of therapy, and his intelligence level was considered to have become stabilized at that time.[5] However, our patients demonstrated a tendency for continued improvement in their intelligence quotients for many years. While, admittedly, a great part of the improvement in mental status occurs during the first two to three years of treatment, in two thirds of the patients in our series

there was a further positive and significant variation between the quotient obtained after treatment had been in effect for periods ranging from three to twelve years and the terminal quotient. Thus, it seems that for a true estimate of such a patient's eventual mental capacity he must be followed for a long time.

Goodkind and Higgins [3] observed some of their patients for years and found 9 of their 23 patients with normal intelligence quotients, ranging from 85 to 112. However, they did not report that serial psychometric studies were made on their patients. Therefore, it is not evident whether the improvement in mental level in their subjects occurred early or whether, as in our experience, the progress was a continuous one.

An important aspect of the study of hypothyroidism in children is the relationship between the time of introduction of treatment with thyroid and the adequacy of therapy on the one hand and the degree of improvement in mental development after treatment on the other. In spite of considerable difference in the age at which thyroid was first given to them, 7 of our patients displayed normal intelligence levels. In some of them therapy had been started as early as 4 weeks, in others as late as 3 years. Six of these patients had taken thyroid regularly and in adequate doses, as described previously. The seventh received insufficient amounts of thyroid in that she took it irregularly. In the mentally retarded patients therapy had been started at 14 months, 3½ years and 7½ years of age, respectively. Two of them had been given adequate and regular therapy.

Furthermore, in the 3 of our 12 patients in whom there was a definite delay in initiating therapy, 2 had finally only low mentality indicated by intelligence quotients of 42 and 67. The third attained normal mentality, with a quotient of 90. In the 2 patients who took thyroid irregularly, 1 remained a low grade moron, while the other became fairly normal with an intelligence level of 82.

A direct relationship between the mental development of the patient after treatment and the age at onset of thyroid therapy and adequacy of its administration is, therefore, not clearly in evidence in all our patients. The results of this study indicate that early therapy makes more likely the development of a mentality commensurate with the patient's developmental possibilities. This does not preclude the eventuality of a patient given early treatment remaining with a low intelligence quotient because of innate limitations. In the 3 patients in whom normal mentality ultimately failed to develop, we have been unable to demonstrate the presence of coexisting cerebral pathologic involvement to account for the poor result. Early and adequate treatment is desirable, since it may have been responsible for the favorable results in several of

our patients. In 9 of our 12 patients a relationship was demonstrated between the adequacy of the therapy and the ultimate mentality.

An index of ultimate mental development is afforded, in the opinion of Bruch and McCune,[1] by the degree of retardation which exists in the patient before treatment. We cannot completely agree with this observation. Many of the children in our series who evidenced decided mental retardation at the time of their first examination eventually made excellent progress. In view of the great capacity for mental growth during the first months of life, attempts should be made to determine whether the child with the least stigmas of hypothyroidism during this period possesses greater potentialities for ultimate normal mental development than the patient with early severe retardation. Unfortunately, a history of reliable clinical observation regarding the degree of mental retardation that existed since birth was not available for many of our patients, so that we were unable to analyze them from that standpoint. Future investigations of this disease should be based on early observation and early and repeated mental testing.

Gesell and his co-workers [6] claimed that the rapidity and extent of early response to treatment are indicative of the patient's ultimate status. An analysis of the response rate in our patients indicated that in 1 patient the early reaction to treatment was unusually slow, while in 3 others it was rapid. However, only 1 of the latter ultimately displayed normal mentality. The patient in whom the early response was slow and not remarkable eventually did well. We have also repeatedly observed continued improvement in the mental status of patients long after treatment was initiated. This occurred regardless of the rapidity and extent of the early response or of the degree of retardation before therapy.

Certain behavior characteristics observed in most of our patients should be emphasized. Their speech was hesitant and often slurring. Their movements and gait were frequently slow. Some were euphoric and given to unnecessary laughter and to aimless smiles and gestures. Their mannerisms, attitudes and emotional characteristics were not those of fully normal adolescents or adults. They did not do too well in school and required vocational training. They were more proficient at manual tasks than in intellectual matters. Some, if not all, of these characteristics were present in every patient. These traits are inconsistent with a concept of complete normalcy, even though they were noted in patients with normal intelligence quotients. The nature of these defects is not apparent by the methods of examination available at present. It is likely that other methods, perhaps electroencephalography, may in the future cast more light on the underlying pathologic cause.

It has been stated by many that the failure to attain a normal mental status by patients who were treated adequately is due to an inherent mental inadequacy not related to the hypothyroidism. This conjecture has gained considerable credence. The characteristic emotional, behavioral and physical abnormalities just described, regardless of intelligence quotient, suggest a failure to achieve a status comparable to that of euthyroid persons of similar intelligence. This might favor the theory that the mental defect is also a result of the hypothyroidism. However, our data do not conclusively support or dispute this concept.

The importance of educational guidance must be emphasized. As in other types of mental retardation, special training brings about an increase in the ability of the patient to utilize his intelligence to its fullest even though the potential mental capacity remains unchanged. Patients who have been deprived of parental cooperation have had to contend with hostility, intolerance and misunderstanding. This imposes a serious obstacle to the efforts of these persons to achieve mental and social normalcy. Two patients in our series who encountered serious parental antagonism were able, nevertheless, to effect satisfactory social and educational adjustments.

In 8 of the children studied, a second psychometric test was performed within less than three years after the initial test (table 5). Four of these patients were still young and had been under treatment for only a short time. The other 4 had been selected from the older group of 12 persons, data on whom constitute the major portion of this report. Information on these patients was included in the table with that on the 4 younger children because, like them, they had been tested when young and retested within one to three years. Six of the 8 patients made significant improvement during the period between the initial and the follow-up testing programs. Final testing of the 4 older children during the present study provided an opportunity to determine whether the progress which was achieved during the first few years of treatment continued into later life. One of the patients, whose quotient of 103 indicated definite improvement within a short time after treatment was started, maintained the same normal level. Another, who after three years of inadequate treatment was at a low level of intelligence with a quotient of 42 remained unimproved at this testing. The third, with a quotient of 75, improved to the level of 82 units, and the fourth, whose intelligence quotient became 61 after nineteen months of treatment, attained a level of 83. This suggests that the improvement which these patients manifest within the first few years of treatment either is maintained or may be increased in later life and provides further evidence that the ultimate prognosis for each patient cannot be determined until late adolescence has been reached.

No correlation was found between variations in statural growth and mental development. All our patients were within normal limits of growth, although some were of short normal height and others were tall. The girl with the greatest degree of mental deficiency (A. F.) is a fully grown young woman with a height of 62 inches. Satisfactory mental development was present in our shorter patients, as well as in the taller ones. Similarly, it was impossible to discover any relationship between mental status and rate of skeletal development. Under the influence of thyroid, skeletal growth proceeded without delay in all but 1 patient.

We are in agreement with most investigators that moderate amounts of thyroid, sufficient to stimulate adequate physical growth without producing toxic symptoms, should be prescribed. We have employed doses of from 1 to 3 grains of thyroid U. S. P. Attempts to increase the dose for some patients to "subtoxic" levels did not induce a more favorable response. In fact, the restlessness, nervousness, hyperactivity and abnormal behaviorisms developed in these children by larger amounts of thyroid interfered with their school work and social conduct sufficiently to cause an apparent retrogression in their mental status. That this retrogression may even be an actual one was demonstrated by the results of psychometric studies in such children by Bruch and McCune.[1]

Withdrawal of thyroid for purposes of investigation invariably brought about a return of symptoms of hypothyroidism. However, the length of the withdrawal period necessary to cause a rise in serum lipids to their previous high levels varied with the individual patient. While in many instances serum hyperlipemia developed within two to four weeks after cessation of treatment, not infrequently as much as twelve weeks was required before this occurred. Since the serum lipid levels may remain normal for some time even after complete withdrawal of therapy, partial withdrawal, as exemplified by inadequate treatment, would remain undetected by this determination. Thus, the use of elevation of serum lipids as an index of the adequacy of treatment is open to question.

Three of our patients were decidedly retarded and 2 were moderately retarded mentally. The other 7 attained a normal intellectual status. In addition, 3 of the 4 young children recently added to this study who have been treated for only a short time already have achieved normal mentality. The adjustment of most of our patients was satisfactory. Their interests were similar to those of average persons, and their social activities also were identical with those of typical adolescents or adults. Even the 3 patients who were mentally retarded were being taught useful occupations, whereby they may expect to obtain suitable

employment and attain a certain amount of financial independence. It appears from this study, therefore, that the outlook in congenital hypothyroidism is not as bleak as has been heretofore pictured.

SUMMARY

1. The patients with congenital hypothyroidism reported on in this study attained normal physical development, statural growth, sexual maturation and skeletal ossification, independent of the age at which treatment was started or the adequacy of its administration.

2. The intelligence quotient of 10 of 16 patients treated for congenital hypothyroidism reached normal levels, ranging from 82 to 107. For 2, it was 77. For the remaining 4, it ranged from 42 to 70.

3. The treated patient presents a characteristic behavioral pattern. This exists even though he has attained a normal intelligence quotient.

4. The greatest amount of improvement occurred within the first few years of therapy. However, continued progress was noted for many years. Therefore, a final appraisal of the mental development of the patient treated for congenital hypothyroidism could not be made until late adolescence or adulthood.

5. In 25 per cent of the patients, no positive relationship could be demonstrated between the age at onset of treatment or the adequacy of its administration and the mental development ultimately attained.

6. The possibility that innate limitations in the patient apart from the hypothyroidism may underlie his failure to attain normal mentality is discussed.

7. Satisfactory educational and socioeconomic adjustment was made by most of our patients.

8. Best results in the treatment of this disease were obtained by the use of doses of 1 to 3 grains (0.06 to 0.2 Gm.) of thyroid U. S. P. daily.

9. Continuous appraisal of the patient's clinical condition offers the most reliable index of adequacy of therapy. The use of other means of evaluating therapy is discussed.

The 4 children used in the study of the early effects of thyroid therapy were private patients of one of us (B. K.). Miss Irma Abramson, of the Social Service Department, assisted in this study.

MEASLES ENCEPHALITIS

Study of Fifty Cases

STEVEN SAWCHUK, M.D.
ALFRED C. LaBOCCETTA, M.D.
ANTHONY TORNAY, M.D.
ALEXANDER SILVERSTEIN, M.D.
AND
AUGUSTIN R. PEALE, M.D.
PHILADELPHIA

DURING the winter and spring of 1946 a severe epidemic of measles took place in Philadelphia. As is usual in epidemics of this disease, there was an increase in the number of complications, one of which was encephalitis. Thirteen thousand and thirty-seven cases of measles were reported to the Health Department. Fifteen deaths occurred in this entire group. Among these 13,037 cases, as far as can be ascertained, were 14 cases of measles encephalitis. The ratio of measles encephalitis was 1 to 1,000 reported cases of measles.

It was our impression from the clinical and necropsy observations that edema of the brain was responsible in a great measure for the symptoms and fatal outcome in several of the patients. Dehydration therapy was instituted in some of our patients in an effort to correct cerebral edema and to study its effects on the symptoms and prognosis of the disease. Whenever it was feasible, the patients with encephalitis in the measles epidemic of 1946 received such therapy.

The results of this investigation were compared with those of previous epidemics. The cases of the last 50 patients with measles encephalitis, including those of 1946, treated at the Philadelphia Hospital for Contagious Diseases were reviewed and analyzed. All the patients who reported for follow-up study to our clinic were examined by a neurologist. The interim from the date of the disease to the time of examination varied from one month to several years. Of the 50 patients, 16 died in the acute stages of the disease and 34 survived. Of the 34 survivors, 19 patients returned for examination. In 3 instances, the family physician gave a report of the patient under his care. Thus, a total of 22 patients were available for follow-up studies. The details of the neuropathologic sequelae will be discussed under the neurologic aspects of the cases.

From the Philadelphia Hospital for Contagious Diseases.

One of our patients seen during the 1946 epidemic, who had been exposed to measles, was admitted in coma with Koplik spots. This patient had not yet shown an exanthem. She failed to respond to treatment and died shortly after her admission to the hospital. A post-mortem examination showed encephalitis with areas of softening of the brain. In this case and in those reported in the literature, there is strong presumptive evidence that the same virus causes the encephalitis in measles as causes the primary disease and that, therefore, it may involve the nervous system early in the disease.

According to Lucksch,[1] in all cases of measles encephalitis the original virus is responsible for the disease and the appearance of cerebral complications is essentially the result of a predisposition of the given person.

From the series of 14 patients with measles encephalitis seen in 1946, it seems probable that the virus during an epidemic year may undergo a change in tropism and attack the brain more readily. Most of our patients with encephalitis exhibited signs of cerebral involvement on about the fifth day from the onset of their measles, indicating that the virus attacks the brain earlier than is generally presumed.

ANALYSIS OF THE FIFTY CASES

In the series of 50 patients 16 died, a mortality rate of 32 per cent. There was a total of 14 cases in 1946 with 6 deaths, a mortality of 42.8 per cent in this group. Prior to 1946, 10 deaths occurred among 36 patients, a mortality rate of 28 per cent.

In the series of 50 patients 42 per cent were boys and 58 per cent girls. Of the 16 who died, 4 were boys, a mortality rate of 25 per cent, and 12, or 75 per cent, were girls. The ratio of the mortality from measles encephalitis in the girls to that in the boys was 3 to 1.

Many of the patients had complications in addition to the measles encephalitis. Eighteen patients had pneumonia with an associated encephalitis. In this group there were 8 deaths, or a mortality rate of 44.4 per cent. The relationship of the white blood cell count to pneumonia and to encephalitis was also investigated (fig. 1). The median leukocyte count in those with encephalitis was 14,286 cells, with a predominance of neutrophils. Of the patients, 73 per cent had 10,000 or more white blood cells. The median leukocyte count in those with pneumonia and encephalitis was 14,167 cells; 67 per cent of these patients had 10,000 or more white blood cells. There was little difference in the leukocyte count in the patients with measles encephalitis with or without pneumonia.

1. Lucksch, F.: Encephalitis Following Varicella, Variola, Vaccination and Measles, Med. Klin. **28**:1554 (Nov. 4) 1932.

Table 1 indicates that 9 patients were in coma, an incidence of 18 per cent. Three, or 33.3 per cent, of these patients in coma died. Seven patients (14 per cent) had convulsions and 3 of these died, a mortality rate of 42.8 per cent. Twenty-two patients, or 44 per cent, of those with measles encephalitis had coma and convulsions; 10 of these died, a mortality rate of 45.4 per cent. According to these data, the chances for survival are less when measles encephalitis is accompanied with convulsions.

Further analysis of the statistics showed that encephalitis was most likely to occur from the fourth to the sixth day after the onset of measles (fig. 2). In more than 84 per cent of the patients encephalitis

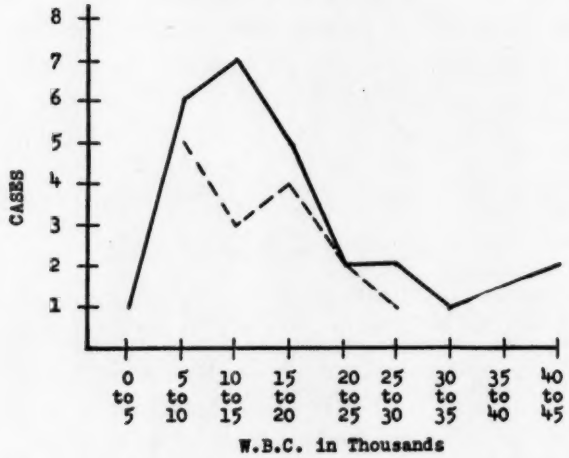


Fig. 1.—Frequency distribution of cases according to total leukocyte count. The solid line indicates number of cases of encephalitis and the broken line number of cases of encephalitis with pneumonia.

TABLE 1.—*Distribution of Patients According to Numbers with Coma and Convulsions*

	Number of Patients	Percentage of Total Patients	Number of Deaths	Percentage of Deaths
Coma	9	18	3	33.3
Convulsions	7	14	3	42.8
Coma and convulsions	22	44	10	45.4
Negative	12	24	0	0
Totals	50	100	16	32.0

developed from the third to eighth day of measles. The earliest onset was on the first day of measles, and the latest occurred on the fourteenth day. The distribution of boys and girls is indicated on the same chart.

Figure 3 shows the age distribution of the 50 patients in this series. There is an irregular distribution of those up to 5 years of age. Of the patients, 48 per cent were from 5 to 8 years of age inclusive. An

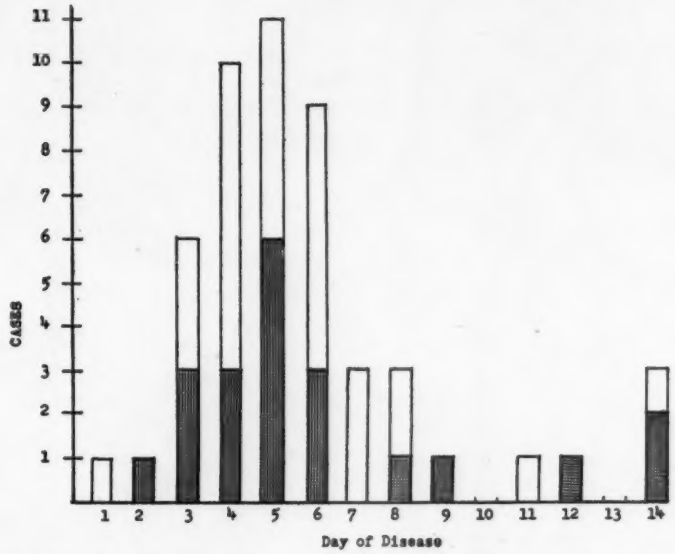


Fig. 2.—Distribution of cases of encephalitis according to number of days after onset of measles. Shaded portions indicate number of boys and white portions number of girls.

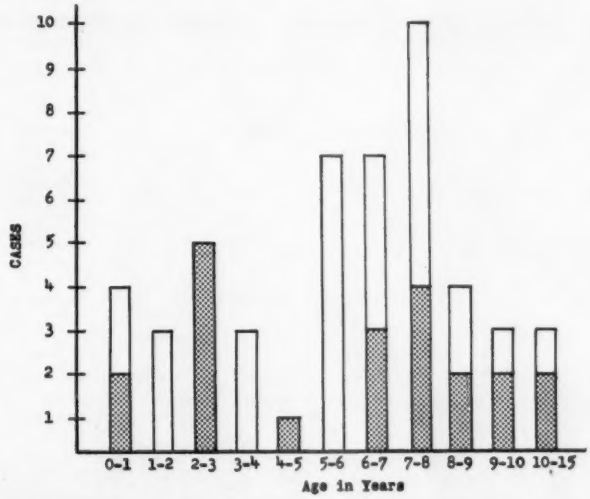


Fig. 3.—Distribution of cases according to age and sex. Shaded portions indicate number of boys and white portions number of girls.

unusually high ratio of girls is seen in this group, they comprise more than 71 per cent of the patients.

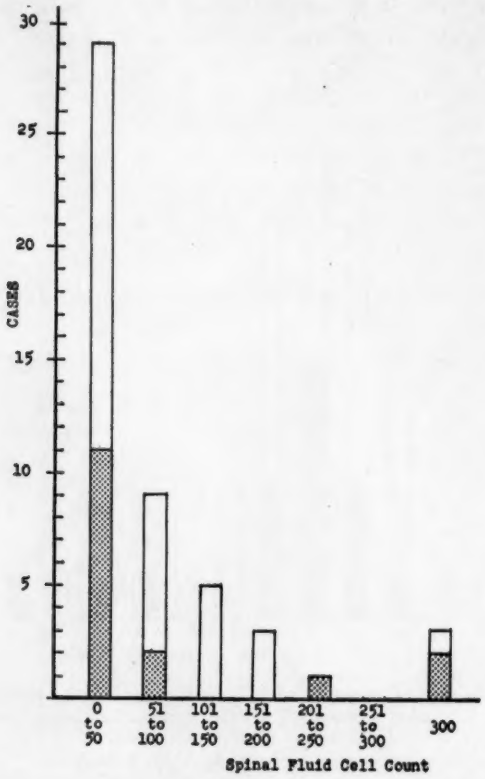


Fig. 4.—Distribution of cases according to the spinal fluid cell count. Shaded portions indicate number of deaths.

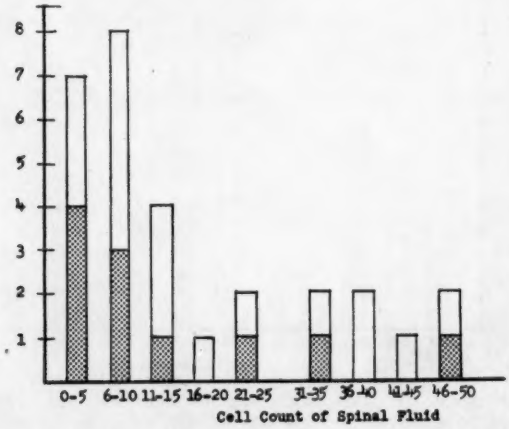


Fig. 5.—Distribution of cases in groups with spinal fluid cell count of 50 or less. Shaded portions indicate number of deaths.

The distribution of patients according to the spinal fluid cell count is shown in figure 4. Twenty-nine patients had 50 cells or less in the spinal fluid. There were 11 deaths in this group, or a rate of 38 per cent, the highest death rate among the groups, according to distribution

TABLE 2.—*Summary of Laboratory Findings of Patients with Measles Encephalitis in 1946*

	Spinal Fluid					Blood Count	
Case No.	Pressure	Total and Percentage Cells *	Protein	Sugar	Chlorides	White Count	Differential, Percentage *
1	Increased	14 P—63 L—37	Normal	†	Low	11,350	P—51 L—42 M— 5
2	Normal	49 P—55 L—45	Increased	†	†	12,100	P—83 L—17
3	Normal	10 P—60 L—40	Normal	Normal	Low	9,500	P—68 L—32
4	Normal	163 L—73 P—27	Increased	Normal	Normal	13,950	P—76 L—19 M— 2
5	Increased	35 P—25 L—75	Increased	Normal	Normal	27,100	P—75 L—15 M—10
6	Normal	14 P—45 L—55	Normal	Normal	Low	4,100	P—50 L—44 M— 2
7	Normal	120 P—89 L—11	Increased	Increased	Low	14,950	P—60 L—35 M— 5
8	Increased	1 ..... L—100	Increased	Increased	Increased	27,100	P—83 L—16 M— 1
9	Normal	66 P— 7 L—93	Increased	Increased	Low	21,950	P—87 L—10 M— 3
10	Normal	2 ..... L—100	Normal	Normal	Normal	9,800	P—79 L—18 M— 3
11	Increased	186 P—65 L—35	Normal	Normal	Low	11,350	P—68 L—32
12	Normal	6 P—17 L—83	Normal	Low	Normal	†	†
13	Normal	19 P—37 L—63	†	†	†	25,800	P—66 L—30 M— 4
14	Normal	8 P—13 L—87	Increased	Low	Low	19,750	P—74 L—22 M— 2 E— 1

* P indicates polymorphonuclear forms; L, lymphocytes; M, monocytes, and E, eosinophils.
† Studies were not performed.

of patients by spinal fluid cell count. From this observation it may be assumed that a low spinal fluid cell count in measles encephalitis indicates a grave prognosis. Further evidence for this is indicated in figure 5, which shows that 75.8 per cent of the deaths in these patients with a low cell count were in the group with less than 25 cells in the spinal fluid.

The following values are normal for the spinal fluid in the laboratory of the Philadelphia Hospital for Contagious Diseases: protein, 15 to 45

mg.; sugar, 50 to 80 mg., and chlorides, 700 to 750 mg., per hundred cubic centimeters. On the first examination, the spinal fluid showed a predominance of polymorphonuclear forms in 5 patients. Two of these reverted to a lymphocytic predominance on the subsequent examination, while the remaining 3 patients still showed a predominance of polymorphonuclear forms.

Data on all the patients seen in 1946 were analyzed as to the spinal fluid findings, which are summarized in table 2.

Table 3, which is a summary of the results of study on the spinal fluid in the 50 patients with measles encephalitis, shows an unusually large number of patients with a low chloride level. No information is

TABLE 3.—*Result of Spinal Fluid Study in Fifty Patients with Measles Encephalitis*

	Low	Normal	High	Not Done
Pressure	0	32	18	0
Cell count	Pleocytosis with lymphocytes predominating			
Protein	1	24	16	9
Sugar	2	26	13	9
Chlorides	28	13	1	8

TABLE 4.—*Mortality in Relation to Therapy*

	Number of Patients	Number of Deaths	Percentage of Deaths
Dehydration therapy	11	3	27.2
Nondehydrating therapy	39	12	30.7

available regarding the chloride level in this disease and its significance has not yet been determined.

DEHYDRATION THERAPY

The purpose of this study was to determine the effects of the disease on the patient and to devise a plan of therapy to reduce the mortality and sequelae.

Dehydration therapy comprised the limitation of fluids given by mouth and the administration of hypertonic glucose solution intravenously, hypertonic magnesium sulfate enemas and concentrated human plasma intravenously. Becuse of the danger of complicating bacterial infection, prophylactic chemotherapy was instituted early in the disease. Except for sulfonamide drugs, used in a few of the early cases, penicillin was the drug of choice.

When the results of dehydration therapy are compared with those of nondehydrating therapy, as shown in table 4, it is evident that the small difference in the percentage of mortality is not statistically significant. It

was our clinical impression that in certain instances, dehydration therapy prevented further involvement of the brain but this was not so in every case.

NEUROLOGIC ANALYSIS

Of the series of 50 patients, 34 were alive at the time of this study. Nineteen of the living patients returned for an interview and examina-

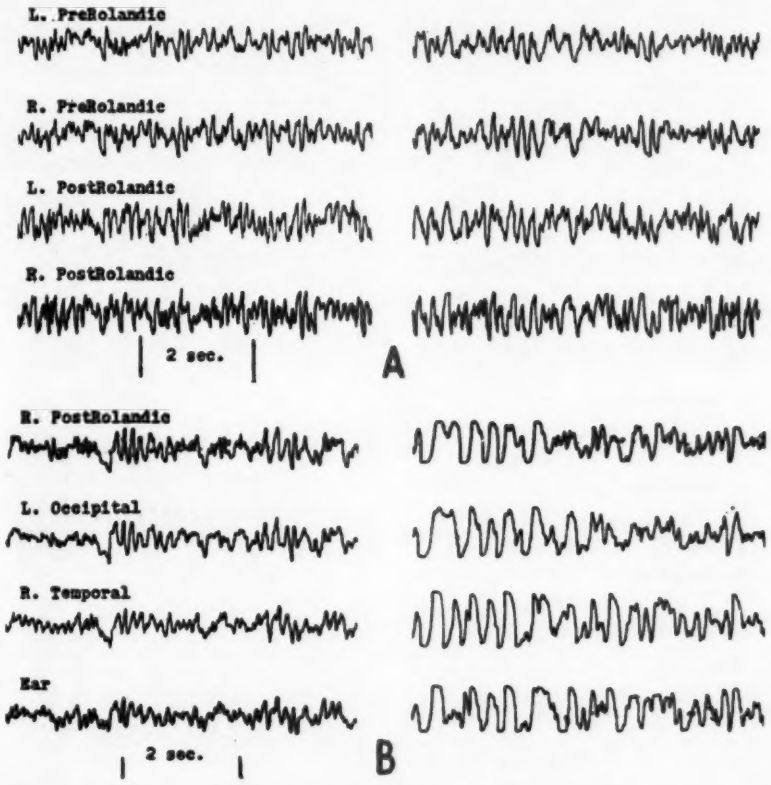


Fig. 6.—*A*, electroencephalogram of patient L. C., showing numerous slow (4 to 6 per second) waves throughout all leads. This is indicative of increased cortical electrical activity and must be interpreted in the light of clinical findings. Prehyperventilation tracings are on the left and posthyperventilation tracings on the right.

This patient had measles encephalitis four years previously. The physical examination at the time the tracings were taken showed atrophy of the left leg, which was the result of preceding poliomyelitis. Otherwise, there were no abnormal neurologic findings.

B, electroencephalogram of patient R. B., showing poorly developed frequency during hyperventilation and immediate posthyperventilation. There are notable bursts of 6 to 7 per second, high frequency waves and occasional tendencies toward block and rolar formations. This picture is consistent with an increased cortical excitability often found in the postencephalitic state. Prehyperventilation tracings are on the left and posthyperventilation tracings on the right.

This patient had measles encephalitis four years previously, at which time he had hallucinations and was irritable. At the time the tracing was taken, the results of physical examination were normal and the intelligence quotient was 117.

tion. All these patients had a complete neurologic and psychologic examination, and the majority of them had an electroencephalogram made as well. None of the patients had abnormal movements of either their upper or their lower extremities.

Five patients of the 19 had a history of convulsions since they were discharged from the hospital. One of the 5 had petit mal attacks five

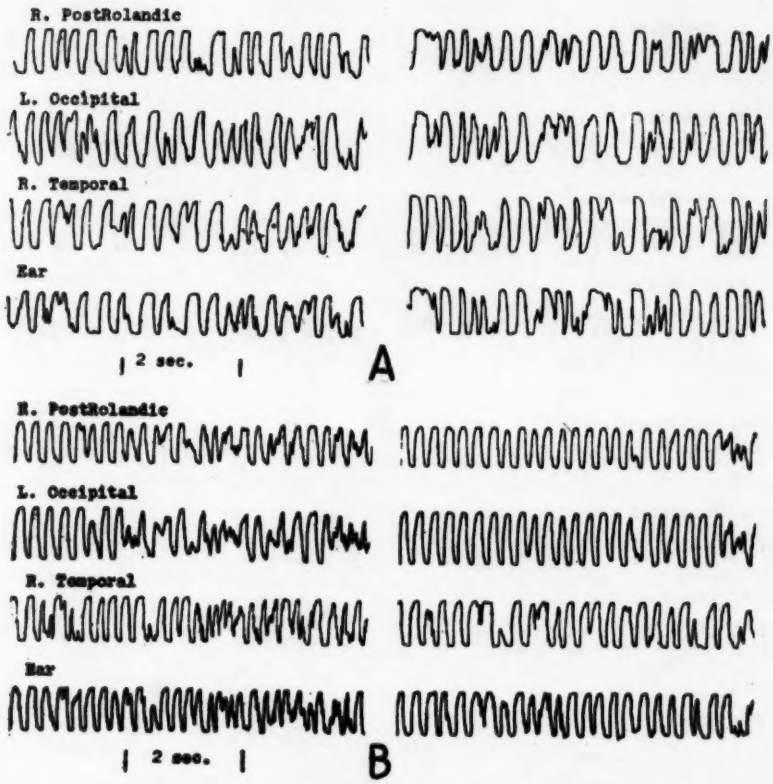


Fig. 7.—*A*, electroencephalogram of patient N. K., showing electrical abnormalities of 3 to 4 per second waves in both hemispheres brought out by hyperventilation. Such changes are observed in postencephalitic states. Prehyperventilation tracings are on the left and posthyperventilation tracings on the right.

This patient had measles encephalitis four years previously, accompanied with irritability and convulsions. The physical examination at the time the tracing was taken revealed that she had a decided gain in weight and only dorsal extension of the left big toe on stimulation. Her intelligence quotient was 131.

B, electroencephalogram of patient L. F., showing scattered, slow, 4 to 6 per second waves in all leads. During hyperventilation there were sustained slow, 4 per second waves appearing synchronously in all leads, forming the so-called locked pattern. There is definite evidence of increased cortical excitability, the significance of which must be determined on a clinical basis. There is no lateralization or other evidence of focal involvement. Prehyperventilation tracings are on the left and posthyperventilation tracings on the right.

This patient had measles encephalitis six months previously. The physical examination at the time the tracing was taken showed no abnormality, and the intelligence quotient was 100.

years after the attack of measles encephalitis; 1 had jacksonian type convulsions, and the remaining 3 had generalized convulsions.

Seven of the 19 patients had normal neurologic findings in the extremities, whereas 12 had normal cranial nerves as determined by the examinations.

Two patients had evidence of cerebellar dysfunction. The presence of this condition in a third patient was not certain. Two other patients had lower motor neuron involvement; 6 patients had signs of upper motor neuron damage, and 1 exhibited signs of disease of the extrapyramidal tract. Four of the 19 patients had facial palsy of central origin. One patient had involvement of the ocular muscles which was not present before the encephalitis. One had pathologic changes in the retina, and another had diffuse lesions of the cranial nerves.

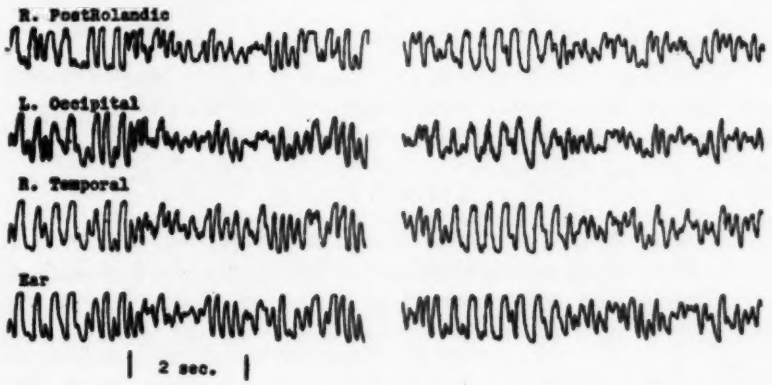


Fig. 8.—Electroencephalogram of patient V. D., showing large, slow, abnormal, 3, 4 and 5 per second waves in both hemispheres, indicative of increased excitability of the cortex. These electrical findings support a diagnosis of encephalitis. Prehyperventilation tracings are on the left and posthyperventilation tracings on the right.

This patient had measles encephalitis nine months previously, at which time he showed cogwheel rigidity of the upper extremities. Physical examination at the time the tracing was taken showed hyperactive knee and ankle jerks and an intelligence quotient of 127.

Six patients showed abnormality of gait. Difficulty with gait was caused by cerebellar ataxia in 1, involvement of the pyramidal tract in another and lower motor neuron lesions in 4.

Of the 19 patients, 13 had had an electroencephalographic examination. The records of only 4 of these were normal. Fourteen patients had a psychologic examination; 5 of the 14 were designated as feebleminded. One child was definitely demented, with an intelligence quotient which classified him as an idiot. The remaining children were mentally defective or showed personality changes. One child with an intelligence quotient of 131 had some personality disorder, but whether this was the result of the encephalitis or was caused by the tension that existed between her and the mother could not be ascertained.

Information about 3 patients who were under private care was supplied by the private physicians. One of these children was apparently normal; another child was epileptic with deterioration of the brain, and the third child had lost one year in school.

The following electroencephalographic tracings and reports are representative of the findings obtained in our abnormal patients.

The following conclusions were made from the results of the neurologic and psychologic examinations:

1. Of the 19 patients examined, only 2 were normal, psychologically and neurologically.

2. The greatest number of neuromuscular disorders involved the extremities; most of the others involved the cranial nerves. The disturbance involved either the extremities alone or the cranial nerves alone, or both.

3. Each child with mental deficiency had also one or more neurologic abnormalities.

4. Four of the mentally defective patients had electroencephalograms made, 3 of which were abnormal.

PATHOLOGIC CHANGES

The pathologic picture of postmeasles encephalitis has been adequately described by many investigators and is briefly discussed in most textbooks dealing with both general and special pathology. Litvak, Sands and Gibel [2] in their report on 56 cases summarize the literature on this subject.

We are presenting observations on 9 patients with central nervous system disease complicating measles who came to autopsy, 8 showing encephalitis and 1 exhibiting leptomeningitis. We are including data on this last patient only to emphasize the fact that meningitis may complicate measles and as a corollary that symptoms and signs referring to the central nervous system in measles are not always indicative of encephalitis. The cases of encephalitis were seen over an eight year period, from 1938 through 1945. The case of meningitis occurred in 1947. These do not include all our deaths due to measles but represent only those complicated by encephalitis, with the one exception as mentioned. We are presenting these cases in a fairly detailed fashion, since interesting observations other than those in the brain were occasionally encountered. However, only positive findings will be enumerated. The necessary comments will appear with the case reports. The postmortem observations, as reported by one of us (A. R. P.), are as follows.

2. Litvak, A. M.; Sands, I. J., and Gibel, H.: Encephalitis Complicating Measles: Report of Fifty-Six Cases with Follow-Up Studies in Thirty-Two, Am. J. Dis. Child. **65**:265 (Feb.) 1943.

REPORT OF CASES

CASE 1.—The body of A. P., an 8 year old Negro boy, was sent to the Philadelphia Hospital for Contagious Diseases for autopsy, which was performed on June 27, 1945, six hours after death.

External examination revealed slight bilateral cervical lymphadenopathy and a generalized macular eruption on the skin, which was fading. The rash was well circumscribed in some areas and confluent in others. Inspection of the abdominal cavity revealed the edge of the liver to be 2 fingerbreadths below the right costal margin. The heart was slightly enlarged to the right.

The heart weighed 125 Gm. The muscle tone was fair. Scattered subepicardial petechial hemorrhages were noted. Microscopic examination revealed grade 2 myocardosis. The left and right lungs weighed respectively 160 and 190 Gm. Scattered subpleural macular hemorrhages were seen throughout all lobes. Patchy areas of atelectasis were present in the peripheral posterior dependent portions. The cut surfaces presented moderate edema and congestion. The tracheobronchial mucosa was hyperemic. Microscopic section confirmed these gross observations; in addition, there were interstitial pneumonitis and scattered intra-alveolar hemorrhages. The bronchial tree presented catarrhal activity of the mucous glands and early acute bronchitis and bronchiolitis.

The liver weighed 760 Gm. It was moderately soft, and its cut sections revealed congestion and granular and fatty alteration. The microscopic findings, in addition to the aforementioned changes, were intranuclear glycogen deposits. The gall-bladder was healthy. The spleen weighed 45 Gm.; the splenic follicles were prominent. Microscopy showed congestion and follicular hyperplasia. Some of the follicles contained a pink-staining material suggesting para-amyloidosis. The adrenals were healthy except for capsular edema. The kidneys were normal in size and presented moderate pallor. Histologic study showed tubular degeneration. The pelvic mucosa, ureters and urinary bladder were grossly healthy, except for submucosal congestion of the last-named organ.

The gastrointestinal tract revealed hyperplasia of Peyer's patches of the ileum and scattered petechiae of the gastric mucosa. The appendix was healthy. The microscopic sections of the ileum confirmed the presence of hyperplasia of the lymphoid apparatus, and at the periphery of one germinal center was a giant cell, with multiple small, round, peripherally placed nuclei, which was interpreted to be the giant cell of measles. The latter has been called the Alagua giant cell or, more recently, the Warthin-Finkeldey giant cell. This cell has been described in prodromal measles, although it has been seen occasionally in the early phase of the clinical disease. It is considered of pathognomonic significance. The pancreas was grossly healthy. The slide prepared from the pancreas revealed mild peri-ductal fibrosis. The thymus presented the normal retrogressive changes.

The brain on gross examination was heavier than normal; it weighed 1,510 Gm. The superficial vessels were engorged. The convolutions were flattened. Coronal sections revealed prominence of the larger and smaller vessels in the white matter and frank evidence of perivascular staining. A definite cerebellar herniation was present. The microscopic sections of the brain prepared from several areas showed congestion and edema; there were perivenous accumulations of inflammatory cells, including lymphocytes, neutrophils and lipophages. In some areas these cells penetrated the vessel walls and spilled over into brain tissue, producing focal aggregations of cells; the latter were predominantly lymphocytes. Nerve cell degeneration was present but was not prominent. There was no satellitosis or neuronophagia, but around some of the nerve cells a single micro-

glial cell was in close approximation. A few of the capillary channels had a pink-staining material within their lumens suggesting thrombus formation. There was early meningitis.

The cause of death was central cardiorespiratory failure, secondary to cerebellar herniation due to postmeasles encephalomeningitis.

CASE 2.—The body of M. A. M., a 4 year old white girl, was sent to the Philadelphia Hospital for Contagious Diseases for autopsy on March 11, 1943, twenty-three hours after death. The body was embalmed prior to autopsy observation.

External examination revealed numerous macular and petechial hemorrhages over the skin of the upper half of the body. The abdominal and thoracic cavities showed no aberrations from the normal.

The heart on gross examination was normal, but microscopic examination presented sparse perivascular and interstitial myocarditis, the intensity of which was labeled grade 1. The myocarditis poses a problem in regard to pathogenesis, yet it is generally agreed that viruses may produce or be associated with myocarditis. Such an association has been shown in poliomyelitis.[3] The lungs were generally firmer than normal. Their cut surfaces were mildly congested and edematous. On microscopic study interstitial pneumonitis and prominent lymphoid follicles in the bronchial walls were seen. Aspiration of gastric contents, as a terminal event, was noted. The liver was slightly enlarged and moderately soft. It showed mild cloudy swelling and fatty alteration. The gallbladder was healthy. The spleen was moderately congested and revealed follicular hyperplasia. The slides confirmed these observations, and many of the centers of the splenic follicles presented degenerative changes. The adrenals were normal except for capsular edema. The kidneys were congested and pale; their microscopic sections showed unsuspected changes in the nature of glomerular proliferation and the formation of occasional fresh crescents. There was perivascular and interstitial mononuclear inflammatory response. The pathologic picture was that of acute diffuse proliferative glomerulonephritis and as such fell into the category of poststreptococcic infection. Perhaps the myocarditis was on a similar basis. The remainder of the urinary tract was normal. The genital organs exhibited normal development. The only significant changes in the gastrointestinal tract were hyperplasia of Peyer's patches of the ileum and moderate mesenteric lymphadenopathy. The nodes on microscopic examination showed reactive hyperplasia; the lymphoid apparatus in the ileum exhibited degenerative changes within the germinal centers. The pancreas was normal.

The brain was heavier than normal, weighing 1,500 Gm. The convolutions were flattened, and the cerebral parenchyma was firm. The superficial vessels of the pia-arachnoid were injected. Coronal sections showed a pinkish red, firm parenchyma with prominence of the smaller vessels in the white matter. The microscopic sections showed edema and congestion. There was occasional perivenous infiltration by lymphocytes and macrophages, although the vessels were well filled with leukocytes. Spotty perivascular hemorrhages and foci of perivascular demyelination were also seen. The nerve cells presented some minimal evidence of satellitosis and neuronophagia. Meningeal reaction was minimal.

The cause of death was postmeasles encephalitis.

CASE 3.—F. R., a 15 month old white female infant, was sent to the Philadelphia Hospital for Contagious Diseases for autopsy on March 3, 1943 and was examined within twenty-four hours after death.

---

3. Peale, A. R., and Lucchesi, P. F.: Cardiac Muscle in Poliomyelitis, Am. J. Dis. Child. **65**:733 (May) 1943.

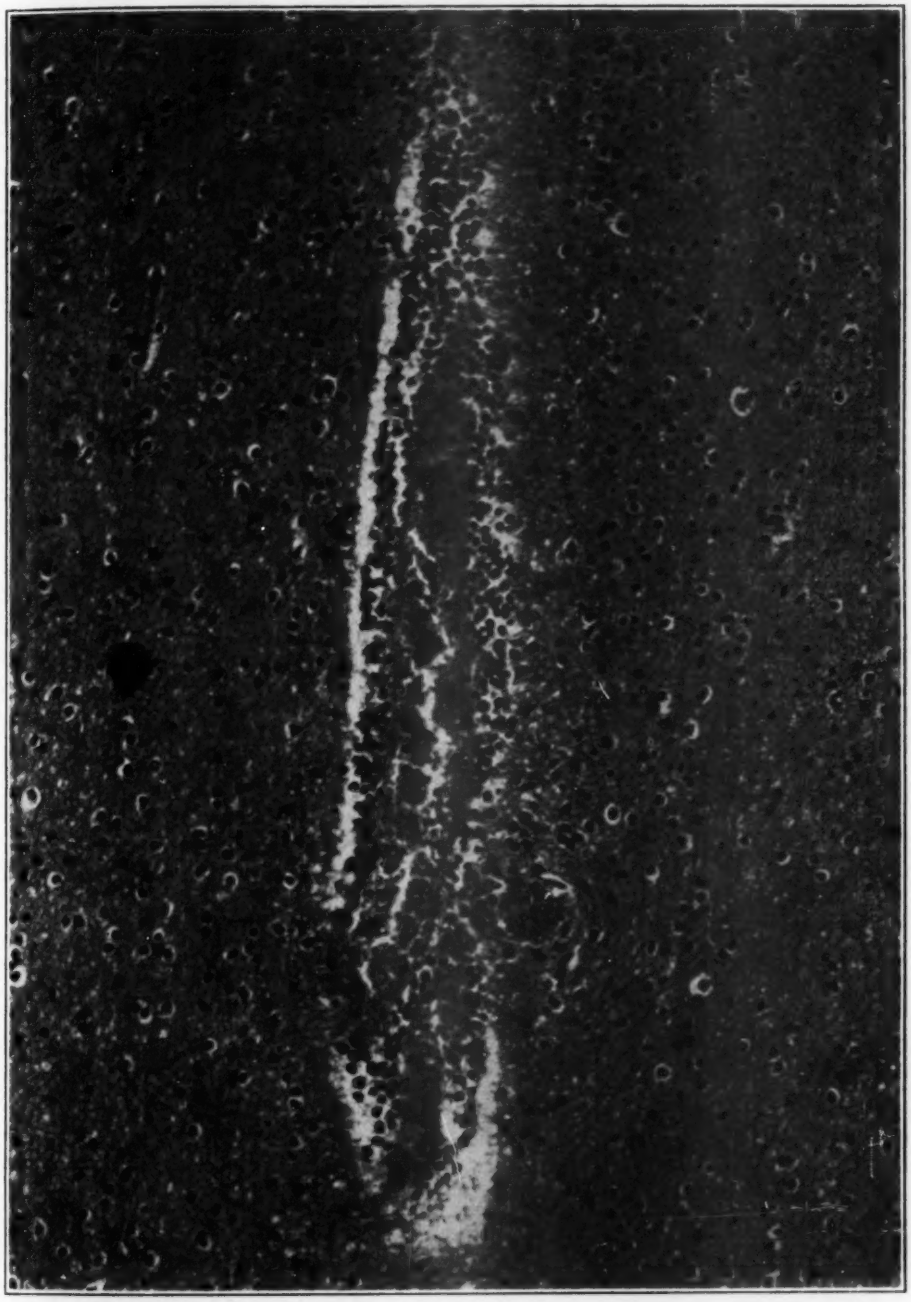


Fig. 9 (case 1).—The perivenous inflammatory reaction in the brain is quite heavy and is predominantly mononuclear, although neutrophils are seen.

External examination revealed nothing significant other than dryness and cyanosis of the lips. The liver was 1 fingerbreadth below the right costal margin. The organs within the thoracic cavity occupied their normal positions and relationships.

The heart weighed 15 Gm. Its cut sections showed some loss of the normal color and consistency and microscopic study revealed grade 1 myocardosis. The left and right lungs weighed 70 and 110 Gm. respectively. The lower halves of both lower lobes were atelectatic. All lobes were firmer than normal on palpation. There was mild congestion. The tracheobronchial mucosa was reddened. Microscopic study revealed suppurative bronchitis and interstitial pneumonitis. The liver weighed 470 Gm.; its gross and microscopic pictures were that of moderate granular and fatty alteration. The gallbladder was healthy. The spleen weighed 35 Gm. and showed mild congestion. The splenic follicles on microscopic study appeared prominent. The adrenals were normal. Each kidney weighed 40 Gm. and appeared congested. The microscopic studies showed tubular degeneration. The remainder of the urinary tract and the entire genital system were normal. The gastrointestinal tract showed reddening of the mucosa of the large bowel and hyperplasia of the solitary follicles. The mesenteric lymph nodes were enlarged, soft and pinkish red, varying from 2 mm. to 1.8 cm. in diameter. Microscopic examination revealed reactive hyperplasia. The pancreas was normal. The thymus revealed stromal increase.

The brain was heavier than normal, weighing 1,140 Gm. It was firm. The pia-arachnoid was lifted upward by lakes of clear cerebrospinal fluid, and the cut surfaces were moist. The convolutions were flattened, and the superficial and deep vessels were engorged. Microscopic study confirmed the presence of gross edema and congestion. There were perivascular demyelination and occasional perivenous inflammatory reaction, predominantly lymphocytic and macrophagic. There were no hemorrhages or meningeal reaction. Scattered and sparse satellitosis and neuronophagia were seen.

The cause of death was postmeasles encephalitis.

CASE 4.—R. C., a 3 year old white male child, died in the ambulance en route to the Philadelphia Hospital for Contagious Diseases, and autopsy was performed on Feb. 13, 1943, within twelve hours of death.

External examination revealed no significant pathologic signs.

The heart weighed 80 Gm. There were mild right-sided dilatation and slight loss of the normal color and consistency. A 2 mm. hemorrhagic cyst was seen on one of the mitral leaflets. Microscopy revealed grade 2 myocardosis. The left lung weighed 90 Gm. and the right 115 Gm. There was patchy atelectasis in the posterior dependent portions of all lobes. The bronchial mucosa was reddened; clinging to its surface was a small amount of mucopurulent exudate. The microscopic sections revealed interstitial pneumonitis and suppurative bronchitis. The liver weighed 450 Gm. and revealed cloudy swelling and fatty alteration; the slides, in addition, presented intranuclear glycogen deposits. The gallbladder was normal. The spleen weighed 50 Gm. and presented mild lymphoid hyperplasia. The slides revealed prominence of the germinal centers. The adrenals were normal. Each kidney weighed 40 Gm.; there were cortical swelling and pallor. The slides showed tubular alteration. The pelvic mucosa, ureters and urinary bladder were healthy. The gastrointestinal tract showed mild reactive hyperplasia of the mesenteric lymph nodes and a Meckel diverticulum lined by intestinal mucosa. The pancreas was normal.

The brain weighed 1,160 Gm. The superficial vessels were engorged. Lakes of clear cerebrospinal fluid were seen beneath the pia-arachnoid. There was prominence of the smaller vessels in the white matter, with some suggestion of perivascular staining. The slides confirmed the presence of edema and congestion. There was no meningeal reaction other than congestion and occasional recent hemorrhage. There were perivascular demyelination and occasional perivenous inflammatory response. Spotty perivascular petechial hemorrhages were noted. Nerve cell degeneration with evidence of satellitosis and neuronophagia was minimal.

The cause of death was postmeasles encephalitis.

CASE 5.—B. R., a 4 year old Negro boy, was observed at autopsy on Jan. 6, 1943, seven hours and fifteen minutes after death.

External examination revealed slight bilateral cervical, axillary and inguinal lymphadenopathy. There was an increase of clear serous fluid in the peritoneal cavity, and the edge of the liver was felt 2 fingerbreadths below the right costal margin. The heart was slightly enlarged to the right. There was 50 cc. of clear serous fluid in each pleural cavity.

The heart weighed 110 Gm. There was bulging of the pulmonary conus in addition to the right-sided dilatation. The muscle tone was fair. Microscopic study revealed grade 2 interstitial myocarditis, characterized by a prominence of eosinophils. The bronchial mucosa was reddened, and clinging to it was a small amount of mucopurulent exudate. The left lung weighed 130 Gm. and the right weighed 150 Gm. There was patchy consolidation in the lower lobe of the left lung. The upper lobe of the right lung showed patchy atelectasis and the corresponding lower lobe revealed hypostatic congestion. Microscopic study confirmed these observations and, in addition, showed interstitial pneumonitis.

The liver weighed 730 Gm. and revealed yellowish areas of fatty alteration. The slides showed early periportal hepatitis and moderate granular and fatty changes. The gallbladder was healthy. The spleen weighed 90 Gm. It was moderately firm and its cut sections showed moderate lymphoid hyperplasia. The follicles on microscopy presented recent hemorrhages and occasional para-amyloid deposits. The adrenals were normal. The sections showed a perivascular inflammatory reaction of the capsular vessels. Each kidney weighed 65 Gm. and revealed cloudy swelling. The pelvic mucosa showed petechial hemorrhages. Microscopic study revealed lower nephron nephrosis. There was distal tubular degeneration, with edema and patchy inflammatory response of the contiguous stroma. A perivenous inflammatory response was evident in the pelvic area. The ureters and urinary bladder were grossly healthy.

The gastrointestinal tract presented hyperplasia of the solitary follicles and of Peyer's patches of the ileum. Microscopic study revealed proliferation of the lymphoid tissue, and at the periphery of one germinal center of a Peyer patch were two or three giant cells of the type described in prodromal measles. The lymph nodes revealed reactive hyperplasia. The pancreas was grossly normal, but its slides showed a diffuse interstitial inflammatory response. The thymus exhibited edema and interstitial leukocytic reaction.

The brain weighed 1,500 Gm. The convolutions were flattened, and the pia-arachnoid was lifted up by lakes of clear cerebrospinal fluid. The superficial vessels were engorged. The smaller vessels in the white matter were prominent, but there was no gross evidence of perivascular staining. Microscopic study, in addition to congestion and edema, revealed perivascular demyelination and perivenous inflammatory response. The leptomeninges presented deep congestion and early low grade meningitis. Nerve cell changes were absent.

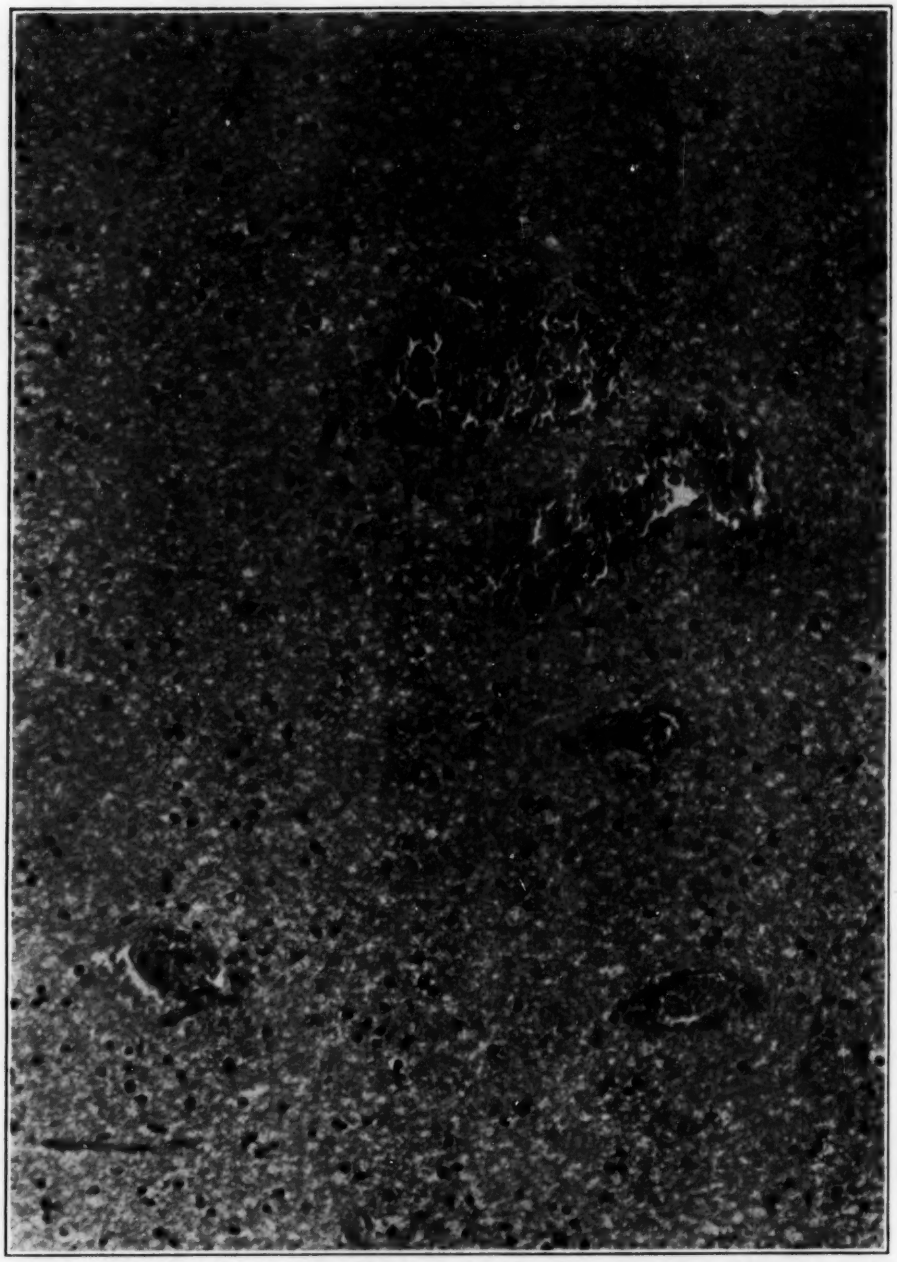


Fig. 10 (case 4).—Low power view showing petechial hemorrhage around the smaller vessels.

The cause of death was postmeasles encephalitis complicated by sulfone reaction. The widespread inflammatory response noted in the heart, liver, thymus and pancreas and the changes noted in the kidneys support this contention.

CASE 6.—J. S., a 5 year old white girl, was examined at autopsy on Jan. 3, 1943, nine hours after death.

External inspection revealed no significant findings.

The heart weighed 95 Gm. and showed slight loss of the normal color and consistency. Microscopy revealed grade 1 myocardosis. The left lung weighed 140 Gm. and the right 150 Gm. The left lung had three lobes, the upper lobe being divided into two by a deep fissure. Deep in the midportion of the lower lobe of the left lung was a 1.5 cm. area of consolidation. Patchy areas of atelectasis were present in the posterior dependent portions of all lobes. Microscopic sections revealed congestion, interstitial pneumonitis and bronchopneumonia. The liver weighed 850 Gm. The cut surfaces showed granular and fatty alteration; there was diffuse vacuolation of the hepatic cells on microscopic study. The gallbladder was healthy. The spleen weighed 35 Gm. and showed lymphoid hyperplasia. The adrenals were normal. Each kidney weighed 75 Gm. Microscopic study revealed diffuse vacuolization of the proximal convoluted tubules. This feature has been seen after administration of hypertonic glucose solution. The ureters and urinary bladder were normal. The genital organs revealed normal development. The gastrointestinal tract exhibited moderate hyperplasia of the Peyer patches of the ileum and moderate reactive hyperplasia of the mesenteric lymph nodes. The pancreas was normal.

The brain weighed 1,220 Gm. The convolutions were flattened. The superficial and deep vessels were engorged. There were areas of perivascular staining in the white matter. Microscopic study showed early meningitis, characterized by edema, congestion and spotty inflammatory cellular reaction. The brain sections exhibited congestion and edema, along with perivascular demyelination and perivenous infiltration, for the most part, of compound granular macrophages. Nerve cell degeneration was present but not prominent.

The cause of death was postmeasles encephalitis.

CASE 7.—This case was reported elsewhere.[4]

CASE 8.—E. A., a 2 year old white male child, was observed at autopsy on May 10, 1938.

No gross description was available, but the gross anatomic diagnosis and microscopic material were present in our files.

The gross diagnosis was bronchopneumonia in the lower lobe of the left lung with overlying fibrinous pleuritis, hepatosis, splenosis and diffuse petechiae of the cerebral hemispheres. The microscopic diagnosis was grade 1 myocardosis, congestion and edema of the lungs with one tubercle and bronchopneumonia. The liver was congested and showed central granular and fatty alteration and one tubercle. Congestion of the spleen was noted, with three tubercles. The kidneys showed vacuolation of the proximal portions of the tubules.

The brain slides showed congestion and edema. Nerve cell degeneration and occasional perivascular demyelination were present. There was no perivenous reaction, although diapedesis of red blood cells was seen in some areas.

CASE 9.—The body of R. H., a 9 year old white boy, was sent to the Philadelphia Hospital for Contagious Diseases for autopsy on Aug. 25, 1947, more than twenty-four hours after death.

---

4. Peale, A. R., and Lucchesi, P. F.: Report of a Case of Measles Encephalitis Complicated by So-Called "Fetal Endocarditis" and Gonorrheal Pyosalpinx, Am. J. Clin. Path. **12**:357 (July) 1942.

Fig. 11 (case 7).—The vessels are surrounded by wide and heavy collars of inflammatory cells and there is a spillage of these cells into the adjacent brain tissue. Demyelination is present.

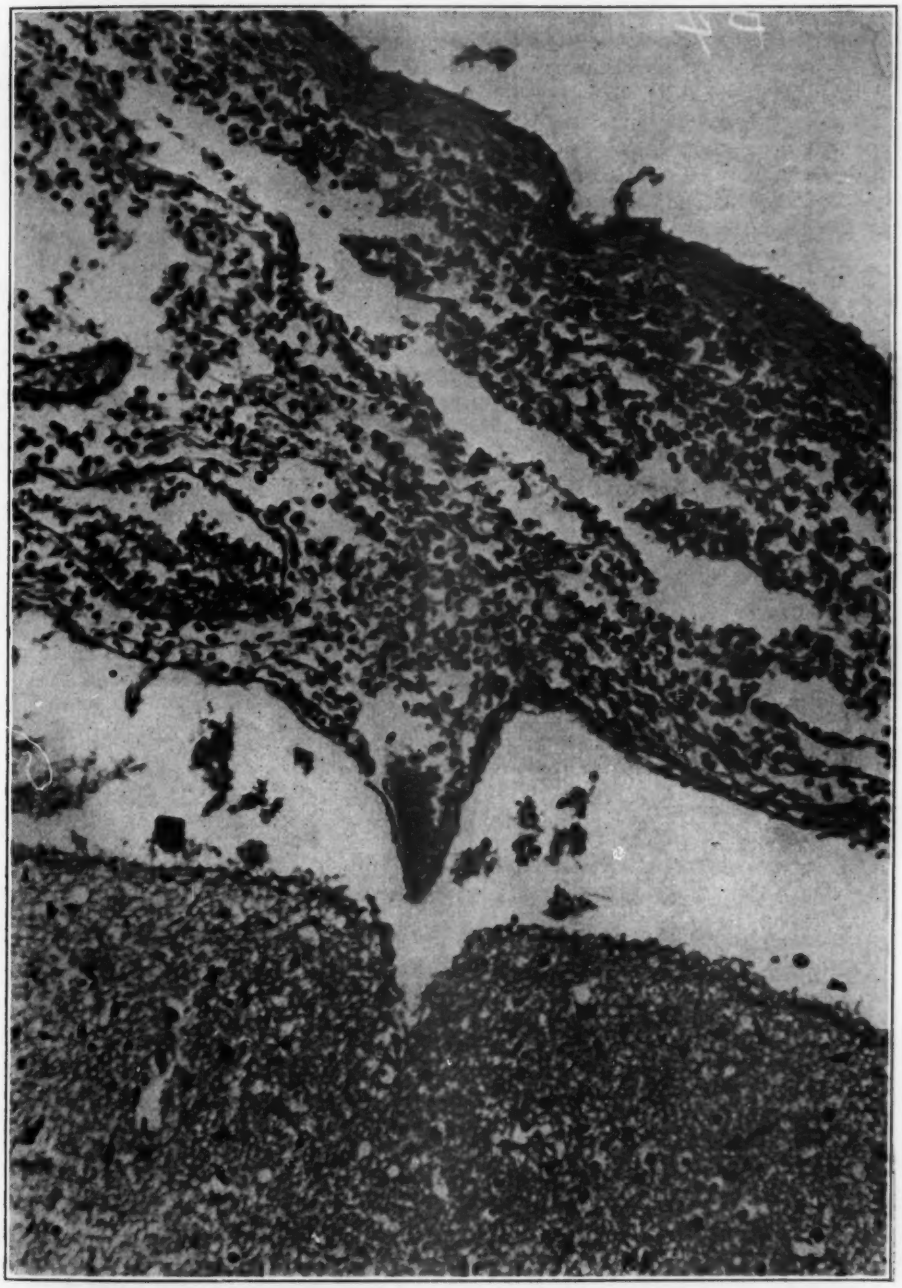


Fig. 12 (case 9).—Microscopic section showing acute inflammatory reaction in the leptomeninges.

The skin presented a generalized reddish pink macular rash, which did not fade on pressure. These lesions varied from 1 to several millimeters in diameter and were characterized microscopically by tiny foci of liquefaction of the basal layer. There was slight hyperkeratosis, with edema, congestion and sparse perivascular lymphocytic reaction in the dermis and superficial part of the corium. The liver was 4 cm. below the right costal margin. The mesenteric and retroperitoneal lymph nodes were enlarged, dusky and soft. They presented reactive hyperplasia. The thoracic cavity revealed no abnormality.

The heart weighed 115 Gm. and was moderately flabby. Microscopy showed grade 2 myocardosis. The left lung weighed 270 Gm. and the right 300 Gm. Both were heavier than normal as a result of congestion and edema. The liver weighed 1,050 Gm. and showed passive congestion. The bile ducts were patent. The spleen weighed 110 Gm. and was soft. The adrenals were normal. Their microscopic picture revealed congestion and a few tiny focal hemorrhages around the vessels in the medullary portions. The left kidney weighed 90 Gm. and the right 85 Gm.; both showed tubular degeneration. The pelvic mucosa, ureters and urinary bladder were grossly healthy. The gastrointestinal tract showed no essential abnormality. The pancreas was normal. The thymus showed no significant changes.

The brain was heavier than normal. The leptomeninges were injected and showed patches of opacity over the brain stem. Coronal sections revealed uniform congestion. Microscopic study revealed congestion, edema and slight nerve cell degeneration. The striking change was the suppurative meningitis. The latter suggests a bacterial origin, and because of the tiny focal hemorrhages in the adrenal medulla one wonders whether the offending organism was the meningococcus, although the other pyogenic cocci may produce adrenal hemorrhage (as in the Waterhouse-Friderichsen syndrome). Bacterial stains were not done, since the main purpose of this paper was to discuss postmeasles encephalitis.

The cause of death was peripheral vascular collapse secondary to acute suppurative meningitis complicating measles.

COMMENT

Several theories have been proposed concerning the complication of measles with encephalitis. Reisman and Rosen [5] stated that there are three views concerning the cause of measles encephalitis. These are (1) that it is due to the virus of measles; (2) that it is an allergic or anaphylactic phenomenon, and (3) that it is caused by an unknown virus separate and distinct from that of measles.

Cary [6] was of the opinion that there are four debatable theories of the causes of measles encephalitis. These are (1) that it is caused by the virus of measles which has acquired neurotropic characteristics; (2) that it is caused by a latent virus activated by the primary disease; (3) that toxins elaborated in the course of measles cause pathologic changes in the central nervous system, and (4) that the changes in the central

5. Reisman, H. A., and Rosen, A. S.: Encephalitis Complicating Measles, Am. J. Dis. Child. **66**:597 (Dec.) 1943.

6. Cary, W.: Encephalitis Complicating Measles, J. Iowa M. Soc. **34**:201 (May) 1944.

nervous system are due to an allergic or anaphylactic reaction to the virus of measles.

It is difficult to prove any of these theories, but there is strong evidence that the virus of measles is the same as that causing the encephalitis. Shaffer, Rake and Hodes [7] were able to isolate the measles virus from the brain of a 7 year old boy who died of encephalitis complicating measles nine days after the appearance of the rash. Clemens [8] reported that in his patient the initial symptoms occurred eleven days before the height of the exanthem. Recovery was rapid and spontaneous as soon as the exanthem appeared.

In our series of patients with measles encephalitis, little of the true spinal form of central nervous system involvement was seen. This type of complication is rare, as pointed out in Brennemann's system.[8a] In those patients who came to postmortem examination, we were impressed by the cerebral edema, passive congestion and occasional minute hemorrhages into the substance of the brain. Because of the postmortem observations, dehydration therapy was employed as a means to reverse or prevent the pathologic process in the brain. It is our feeling at present that dehydration therapy may have been instrumental in reducing the cerebral edema in several patients and made the process reversible. Dehydration methods are by no means the best and only form of therapy that has been partially successful. Hamilton and Hanna [9] reported fair results in 9 patients who were treated with typhoid vaccine intravenously.

Rosenheck and Barowsky [10] stated that encephalitis occurs after measles more commonly than after any of the other diseases of children. This is probably the case during a severe epidemic of measles such as was present in Philadelphia in 1946. It is difficult to determine whether the measles virus becomes neurotropic during an epidemic or whether more cases of measles encephalitis appear because of the increased incidence of measles. Litvak, Sands and Gibel [2] expressed their belief that the incidence of this disease is on the increase, especially during epidemics.

---

7. Shaffer, M. E.; Rake, G., and Hodes, H. L.: Isolation of Virus from a Patient with Fatal Encephalitis Complicating Measles, Am. J. Dis. Child. **64**:815 (Nov.) 1932.

8. Clemens, H. H.: Premeasles Encephalitis: Report of a Case, J. Pediat. **22**:731 (June) 1943.

8a. Ford, F.: Acquired Diseases of the Spinal Cord, in Brennemann, J.: Practice of Pediatrics, edited by I. McQuarrie, Hagerstown, Md., W. F. Prior Company, Inc., 1948, vol. 4, chap. 17, p. 7.

9. Hamilton, P. M., and Hanna, R. J.: Encephalitis Complicating Measles: A Report on Two Hundred and Forty-One Cases Collected from the Literature and on Forty-Four Additional Cases, Am. J. Dis. Child. **61**:483 (March) 1941.

10. Rosenheck, C., and Barowsky, H.: Paraplegia Following Measles, J. A. M. A. **108**:717 (Feb. 27) 1937.

The diagnosis of measles encephalitis was based on several symptoms. These signs were coma, convulsions, stupor or drowsiness, with or without spinal fluid changes. In this series there were patients who had transitory and bizarre neurologic responses with spinal fluid changes and they were classified as having measles encephalitis.

It can be said that no specific, characteristic pattern of the electroencephalographic tracings is seen in patients with encephalitis. In general, the records are characterized by slow abnormal high voltage waves (sharp and slow waves) with a frequency of 2, 3 or 4 per second. The degree of abnormality in all these patients was increased by hyperventilation. In every patient in whom an abnormality was noted it was generalized. Whether the record was dominated by abnormal waves or whether these abnormal waves were interspersed among more normal frequencies seemed to be related to the severity and intensity of the encephalitic process.

Most investigators stressed the perivascular demyelination and the paucity of changes in the gray matter, although admitting that minor degenerative changes, including chromatolysis, satellitosis and neuronophagia, may affect the nerve cells. The process tends to be diffuse and is localized primarily to the white matter of the cerebral hemispheres, the peduncles, pons, cerebellum and, infrequently, the spinal cord. There may be slight meningeal inflammatory reaction. The superficial meningeal and the deeper vessels of the brain are congested. Petechial hemorrhages in the brain and meninges may or may not be present. The more striking changes, however, are seen in the white matter and more specifically about the veins; these consist of perivenous collections of lipid-laden macrophages and mononuclear cells, predominantly lymphocytes. Perivenous demyelination is prominent, although it varies in intensity. This reaction, however, is not specific for encephalitis complicating measles, as we have seen it in the other types of postinfectious encephalitides, including postvaccinal encephalitis.

The gross picture of encephalitis complicating measles is suggested by edema, engorgement of the superficial meningeal vessels and prominence of the smaller vessels in the white matter. An occasional case may show perivascular staining indicating focal hemorrhages. The brain is heavier than normal, and the convolutions are flattened as a result of the edema. In some cases a cerebellar herniation cone may be present and may account for central cardiorespiratory failure. Again, these gross changes are not specific, as they may be seen in any of the encephalitides and may be present in circulatory insufficiency or failure.

We are stressing the nonspecificity of the gross and histopathologic features in order to emphasize the importance of the clinical evaluation, since too often the pathologist is expected to make gross and histo-

pathologic diagnoses on the basis of inadequate or absent clinical details. The rash in measles tends to fade or to be entirely faded at the autopsy table, so that this clinical sign is frequently absent.

The causation of measles encephalitis is still a disputed matter, and we are unable to offer anything constructive after a study of the pathologic changes in our patients, although the variations in the histopathologic reactions indicate that one or more of the suggested factors may operate in different cases. The lesions in the brain are said to be the result of the measles virus itself; they may be due to a toxic reaction or to an allergic type of response. The activation of a virus dormant in the brain tissue by the measles episode has also been considered in pathogenesis. We are assuming, of course, that measles is a virus disease and rightly so, according to majority opinion.

SUMMARY AND CONCLUSIONS

1. A series of 50 cases of measles encephalitis is reviewed, with the results of follow-up neurologic and psychologic examinations.

2. The mortality rate for this series was 32 per cent.

3. Dehydration therapy did not alter the mortality rate.

4. Those patients with less than 50 cells in the spinal fluid had a relatively higher mortality rate.

5. Only 2 of 19 patients given follow-up study were perfectly normal by electroencephalogram and neurologic and psychologic examination.

6. Fourteen of the 19 patients given follow-up study have minor sequelae involving the extremities.

Dr. Joseph Hughes, visiting chief of the Department of Psychiatry, Philadelphia General Hospital, supplied the electroencephalograms and their interpretations. Miss Phylis Walsh, psychologist, Philadelphia General Hospital, conducted the psychologic examinations.

Front and Luzerne Streets (40).

FEBRILE CONVULSIONS IN CHILDHOOD

A Clinical and Electroencephalographic Study

MARGARET A. LENNOX, M.D.
NEW HAVEN, CONN.

SEVERAL years ago, electroencephalographic and clinical observations on 150 children with febrile convulsions [1] were reported. Since then, 90 cases have been added to the series and a follow-up study of some of the original group has been completed. Observations on the original and added cases form the basis of this report.

Convulsions occur in an estimated 6 to 7 per cent of children under the age of 5 years, and fever precipitates the convulsions in half the cases.[2] Opinions concerning the significance of the febrile convulsions have varied. Some authors expressed the belief that they bear no relationship to epilepsy.[3] Others were of the opinion that febrile convulsions occur in children who have a hereditary predisposition to convulsions and increase their likelihood of having recurrent convulsions in adult life.[4]

Neyroud [5] reported electroencephalographic abnormalities diagnostic of epilepsy in 3 per cent of 70 children with febrile convulsions.

Although the prime interest in the present study was to delineate the clinical and electroencephalographic characteristics of children with

---

From the Department of Psychiatry and Mental Hygiene, Yale University School of Medicine. Aided by a grant from the Medical Fluid Research Funds of Yale University.

1. Lennox, M. A.: Febrile Convulsions in Childhood, A. Research Nerv. & Ment. Dis., Proc. **26**:342, 1947.

2. (*a*) Patrick, H. T., and Levy, D. M.: Early Convulsions in Epileptics and in Others, J. A. M. A. **82**:375 (Feb. 2) 1924. (*b*) Thom, D. A.: Convulsions of Early Life and Their Relation to the Chronic Convulsive Disorders and Mental Defect, Am. J. Psychiat. **98**:574, 1942.

3. (*a*) Husler, J.: Systematik und Klinik epileptiformer Krampfkrankheiten in Kindesalter, Ergebn. d. inn. Med. u. Kinderh. **19**:624, 1921. (*b*) Livingston, S.; Bridge, E. M., and Kajdi, L.: Febrile Convulsions: Clinical Study with Special Reference to Heredity and Prognosis, J. Pediat. **31**:509, 1947. (*c*) Herlitz, G.: Studien über die sog. initialen Fieberkrämpfe bei Kindern, Acta pædiat. (supp. 1) **29**:1, 1941.

4. (*a*) Lennox.[1] (*b*) Footnote 2. (*c*) Faerber, E.: Klinische Beobachtumgen über die Initialkrämpfe im Kindesalter, Jahrb. f. Kinderh. **124**:148, 1929.

5. Neyroud, M.: Etude clinique et électro-encéphalographique des convulsions hyperpyrétiques, Praxis **36**:759, 1947.

febrile convulsions, these characteristics have been evaluated with respect to prognosis. The reader is referred to the work of Herlitz [8c] for a complete review of the literature and exhaustive clinical investigation.

METHODS AND MATERIALS

Children with a history of febrile convulsions were referred for diagnostic electroencephalographic study by the inpatient or outpatient services of the Pediatric Department of the Grace-New Haven Community Hospital. A small number of patients was also referred by private physicians or by agencies, and several in the seizure section of the psychiatric outpatient clinic of the Grace-New Haven Community Hospital were followed. Through the courtesy of Dr. William Lennox, the electroencephalograms and clinical histories of 80 children at the Children's Hospital of Boston were made available.

The electroencephalograms were obtained with three, four, six and eight channel Grass ink-writing electroencephalographs. Electrodes were placed bilaterally in the frontal, central, parieto-occipital and temporal areas, and recordings with reference to scalp and interconnected ears were routine. In the later records, the recordings were obtained with reference to both and to alternate ears, and scalp to scalp recordings were made as well. Only recordings were used which were sufficiently free of movement and other artefacts to be interpretable. The normal control group consisted of 373 unscreened normal children, whose electroencephalograms were obtained in the pediatric outpatient department of the Grace-New Haven Community Hospital, with the cooperation of Dr. Donal Dunphy, and at the Children's Hospital of Boston. The latter records were made available through the courtesy of Dr. and Mrs. F. A. Gibbs, In addition reliance was placed on the descriptions of normal electroencephalograms in the "Atlas of Electroencephalography" [6] and in the monograph by Henry.[7]

Electroencephalograms were classified according to the system of Gibbs, Gibbs and Lennox [8] as normal, moderately or very slow, moderately or very fast, paroxysmal or focal. Records showing extreme slowing, with a predominance of high voltage, rolling, 1 to 3 per second waves, were classified separately. Originally those records were classified separately in which slow waves appeared predominantly or exclusively in the occipital leads. Clinical and statistical findings on normal and "sick" groups have forced the opinion that these records are normal; so they are included in the normal group in the present study.

The hospital charts of all patients were reviewed, and an attempt was made in each case to obtain the following information: the child's age at the time of each convulsion with fever; the number of convulsions and their description; the height, cause and duration of the fever with each episode, and the number of days between the last convulsion and the electroencephalogram. The presence of a family history of convulsions, significant items in the past personal history, (history of birth, injury to the head, infections of the central nervous system and the common contagious diseases of childhood) and an estimate of mental development were additional historical items which were obtained. Results of pertinent laboratory studies, such as the lumbar puncture, were recorded.

6. Gibbs, F. A., and Gibbs, E. L.: Atlas of Electroencephalography, Boston, The Authors, 1941.

7. Henry, C. E.: Electroencephalograms of Normal Children, Monographs of the Society for Research in Child Development, 1944, vol. 9, no. 3.

8. Gibbs, F. A.; Gibbs, E. L., and Lennox, W. G.: Electroencephalographic Classification of Epileptic Patients and Control Subjects, Arch. Neurol. & Psychiat. **50**:111 (Aug.) 1943.

RESULTS

A. Clinical Findings.—The tendency to respond to fever with convulsions appeared to be determined by three main factors: sex, age and family history.

Sex: Febrile convulsions were twice as common in boys as in girls (table).

Clinical Findings on Two Hundred and Forty Children with Febrile Convulsion

	Type of Electroencephalographic Tracing									
	Normal		Moderately or Very Slow		Moderately or Very Fast		Extremely Slow and/or Focal		Paroxysmal		Total	
Data	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Sex—Male	103	61.0	7	53.8	12	92.3	17	56.6	10	62.5	149	62.0
Female	66	39.0	6	46.2	1	7.7	13	43.4	6	37.5	92	38.0
Age at onset, years												
< 1	37	22.3	5	38.5	..	....	6	20.7	6	37.5	54	22.9
1 to 2	109	65.6	8	61.5	7	58.4	19	65.5	6	37.5	149	63.2
3 to 4	13	7.8	..	....	4	33.3	3	10.3	3	18.8	23	9.7
5 +	7	4.2	..	....	1	8.3	1	3.4	1	6.3	10	4.2
Age, years (time of electroencephalogram)												
< 1	12	7.1	4	30.8	1	7.7	6	20.0	..	....	23	9.5
1 to 2	100	59.2	9	69.2	3	23.1	20	66.6	1	6.3	133	55.5
3 to 4	25	14.8	..	....	3	23.1	3	10.0	5	31.2	36	15.0
5 +	32	18.9	..	....	6	46.1	1	3.4	10	62.5	48	20.0
Family history of convulsions												
None	76	56.7	6	66.7	8	72.7	15	65.2	4	50.0	109	58.8
Convulsions	58	43.3	3	33.3	3	27.3	8	34.8	4	50.0	76	41.2
(Epilepsy)	11	18.9	..	....	1	9.1	1	12.5	2	25.0	14	7.7
(Rare convulsions)	47	24.4	..	....	2	16.2	7	22.3	2	25.0	62	33.5
Both sides	5	....	..	....	1	....	1	....	4	....	11	....
Severity of convulsions												
Mild	84	68.9	8	89.0	6	85.7	3	11.2	5	45.5	106	60.2
Severe	38	31.1	1	11.0	1	14.3	24	88.8	6	54.5	70	39.8
Number of episodes												
1 or 2	132	78.8	13	....	13	....	30	....	10	62.5	198	82.5
3 +	37	21.9	..	....	..	....	..	....	6	37.5	43	17.5
Height of fever												
< 102.9 F	15	11.2	1	10.0	2	25.0	7	28.0	2	16.6	27	14.4
> 103 F	118	88.8	9	90.0	6	75.0	18	72.0	10	83.4	161	85.6
Duration of fever, days												
1 to 4	57	86.4	3	75.0	2	....	8	53.4	3	75.0	73	80.2
5 +	9	13.6	1	25.0	..	....	7	46.6	1	25.0	18	19.8
Development												
Normal	97	84.4	5	83.3	4	36.4	13	76.5	8	61.5	127	78.4
Retarded	18	15.6	1	16.7	7	63.6	4	23.5	5	38.5	35	21.6
Birth history												
Normal	102	75.0	6	75.0	6	54.5	16	80.0	6	50.0	136	72.8
Abnormal	34	25.0	2	25.0	5	45.5	4	20.0	6	50.0	51	27.2
Interval from convulsion to electroencephalographic study, days												
1 to 7	74	48.4	8	66.6	..	....	24	88.8	3	21.4	109	50.7
8 +	79	51.7	4	33.4	9	....	3	11.2	11	78.6	106	49.3

Age at Onset: The tendency to respond to fever with convulsions was confined largely to children at 1 and 2 years of age (63 per cent). The first febrile convulsion occurred after the third birthday in only 12 per cent of the children (table).

Family History: The tendency toward convulsions with fever appeared to be hereditarily determined in the majority of children: Forty-five per cent of children with febrile convulsions had a family history of convulsions, as opposed to 3 per cent of children who did not

have convulsions with fever.[2a] The usual history obtained was that a sibling, or a parent, or a sibling of the parent, had febrile convulsions or had a few convulsions in infancy or in later life for no known cause. A history of benign or isolated or infantile convulsions was obtained much oftener than a history of recurrent convulsions or epilepsy (table).

When febrile convulsions occurred, they were usually mild; there were generally only one or two febrile convulsive episodes, and the fever was usually high and of short duration.

Severity of Febrile Convulsions: I have utilized the definition of a severe convulsion given by Patrick and Levy;[2a] a convulsion was classified as severe if it or the following coma lasted an hour or more, or if it started in or involved chiefly one limb or one side of the body. By these criteria, the majority of febrile convulsions were mild. Severe convulsions occurred in a surprisingly high (40 per cent) percentage of children, however (table). They occurred oftener in children 3 years of age or under than in those over 3 years; half the children under 1 year of age with febrile convulsions had severe convulsions. Particular interest attached to these convulsions, some of which were followed by transient or permanent neurologic sequelae, such as hemiparesis or retarded mental development. They will be discussed at greater length in connection with electroencephalographic findings.

Number of Febrile Convulsive Episodes: The majority of children with febrile convulsions had only one convulsive episode, and only 18 per cent had three or more such episodes.

Height of Fever: The recorded temperature was 103 F. or over in 86 per cent of children who had febrile convulsions. The rapidity of rise of fever was not determined but experimental[9] and clinical[10] observations suggest that even a high fever does not produce febrile convulsions unless the rise is rapid.

Duration of Fever: The elevation in temperature was of short duration in the majority of children for whom it was recorded. It lasted five or more days in only 20 per cent of the children.

Cause of the Fever: In the majority of the children, the fever was attributed to infection of the upper respiratory tract or pneumonia. In one fourth of them, the cause was one of the common childhood infections, such as exanthem subitum and inoculation, but there were too few children in each group to permit evaluation of the possible role played by the type of infection.

Mental development was normal in 78 per cent of the children and was retarded (an intelligence quotient below 80 or gross retardation without testing) in 22 per cent.

---

9. (*a*) Wegman, M. E.: The Relation of Convulsions and Hyperthermia, J. Pediat. **14**:190, 1939. (*b*) Unpublished data.

10. Herlitz.[3c] Faerber.[4c]

Birth history was normal in 74 per cent. Classified as abnormal were breech deliveries, cases of placenta previa with severe bleeding, use of high or middle forceps, cesarean delivery, twin birth and prematurity if the weight at birth was less than 5 pounds (2,268 Gm.). There was 1 patient with hemorrhagic disease of the newborn. One patient, jaundiced at birth, had an Rh-negative mother and an Rh-positive father.

Lumbar puncture was performed on 57 patients, and no abnormalities in cells or proteins were observed. No patients were included in this

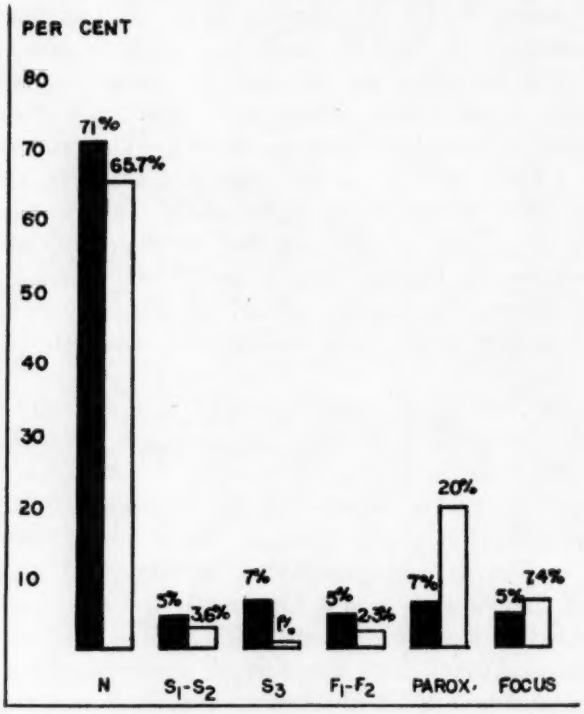


Fig. 1.—Graph comparing electroencephalographic findings on 240 children having febrile convulsions (black columns) with those on 295 children having grand mal epilepsy (white columns). All children were between 0 and 10 years of age. *N* indicates a normal record; S_1-S_2, a moderately or very slow one; S_3, an extremely slow one; F_1-F_2, a moderately or very fast one; *Parox.*, a paroxysmal record, and *Focus*, a localized abnormality.

study who had findings suggesting infection of the central nervous system as a cause of the fever.

B. Electroencephalographic Findings.—All the children in this series had at least one electroencephalogram. In half the children, the electroencephalogram was obtained within a week of the febrile convulsion. The electroencephalographic findings are represented in

figure 1, where the observations on 295 children in the same age group with grand mal epilepsy are presented for comparison.

C. Correlation of Electroencephalographic and Clinical Data.—Some conclusion may be drawn concerning the significance of the various types of electroencephalograms by examining the clinical features of the patients in each group (table).

1. Normal Electroencephalograms: Children with a normal electroencephalogram were presumably those whose convulsions were most apt to be benign and who showed the least chance of having recurrent convulsions without fever. It must be remembered that this group was diluted somewhat by the inclusion of children whose electroencephalograms had returned to normal, but for whom abnormalities would have been found if the electroencephalogram had been taken within a week of the febrile convulsion, as in the following case. The group was large enough, however, that the clinical generalizations are probably reliable.

CASE 1.—L. H., a girl, was first seen at 25 months of age. Her birth was normal and the neonatal period uncomplicated. She had no illnesses in infancy, and development was satisfactory: At the age of 2 years she walked alone and could say nine words. Her family history was negative for convulsions.

At 21 months of age, she had an infection of the upper respiratory tract with a temperature of 104 F. and had her first febrile convulsion, lasting ten minutes. A similar episode occurred at 22 months. At 23 months of age, she again acquired a respiratory infection, but this time her temperature rose to 106 F., and her convulsion involved first the right side, then only the left side and then only the right side. This lasted over an hour and was finally controlled by sedation, but she remained out of contact for several days. When she regained consciousness, she had right hemiparesis and gross mental retardation. Examination by Dr. Catherine Amatruda two months after the acute episode revealed a developmental level of 36 weeks at a chronologic age of 25 months. Her electroencephalogram was normal, but there is no question that abnormalities would have been seen if an electroencephalogram had been obtained sooner. This case exemplifies the common finding that the electroencephalogram returns to normal after an acute insult to the brain, although the patient may be left with irreversible neurologic deficit.

In general, children wih a normal electroencephalogram had an age at onset between 1 and 3 years, with the great majority before 3 years, and had one or two mild febrile convulsive episodes with a temperature of 103 F. or over lasting no more than four days. Mental development and birth history were normal. Even in this group, composed largely of those with "benign" febrile convulsions, 48 per cent had a family history of convulsions (almost all, however, being also "benign" infantile or isolated convulsions), and it was surprising to find that 30 per cent of these children had had a severe convulsion.

Clinically, children with extremely slow and with focal electroencephalographic abnormalities resemble each other and will be discussed together.

2. Extremely Slow and Focal Electroencephalographic Abnormalities: These were found in 30 children, or 12.5 per cent of the cases. Some examples are shown in figure 2. Clinically, these children differed from the normal group in the following respects: An extremely slow or focal electroencephalogram was almost invariably obtained in children under 3 years of age who had a severe convulsion within

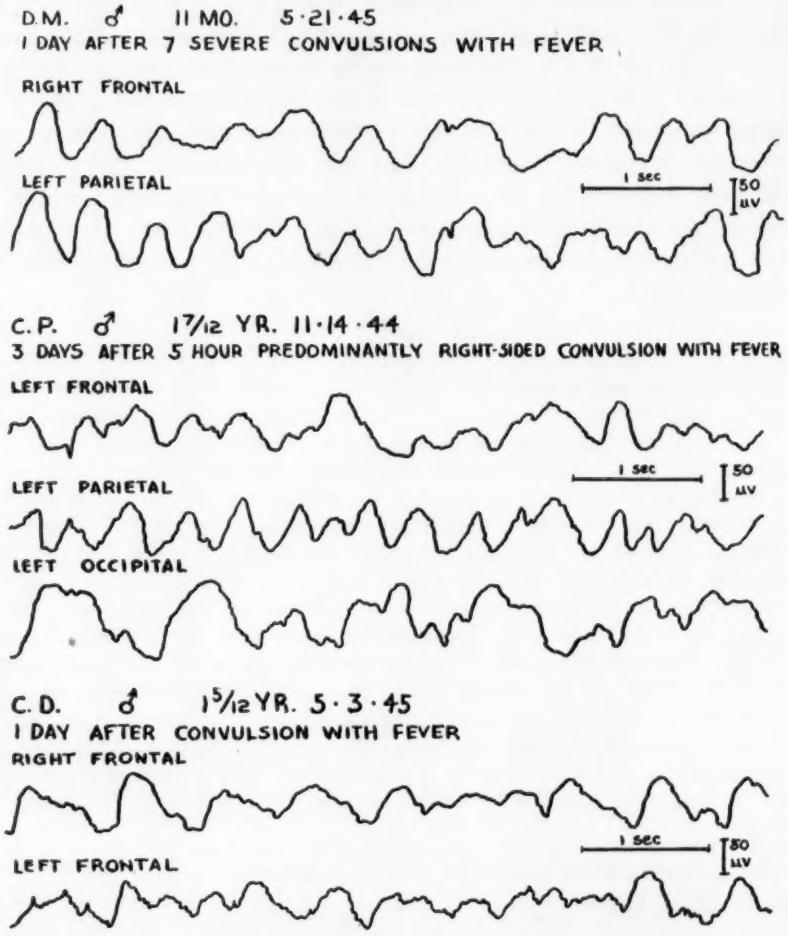


Fig. 2.—Several examples of extremely slow electroencephalograms obtained on children with febrile convulsions.

seven days of the electroencephalographic study. In addition, the elevation in temperature tended to be somewhat lower and to last longer (often more than five days) than in the normal group. The extreme and focal slowing could not be attributed to an elevated temperature at the time of the recording, since the temperature was still slightly elevated when the electroencephalogram was made in only

4 cases. Nor could it be attributed to the ordinary postconvulsive stupor which almost never persists as long as a day. An interval of at least a day elapsed between the convulsion and the making of the electroencephalogram in all these children with febrile convulsions. Furthermore, these extremely slow electroencephalograms did not resemble the usual record in postconvulsive stupor, in that slowing was frequently most notable in the occipital leads and more pronounced on one side than on the other.

Since extremely slow electroencephalograms were rarely encountered when more than a week elapsed between the febrile convulsion and the electroencephalographic study, it must be assumed that the electroencephalogram returned to normal in spite of longer lasting evidence of neurologic deficit. In 5 instances, the electroencephalogram was repeated six days to three months later and the abnormality had disappeared. Focal abnormalities disappeared more slowly, however. Repeat electroencephalograms were obtained on 8 children at intervals of six days to one year after the first recording, and 4 of them still showed focal abnormalities.

Although the electroencephalograms undoubtedly returned to normal in time, it seemed likely that an extremely slow or focal electroencephalographic abnormality indicates pathologic changes in the brain, the result of the convulsion and fever. Other evidences of brain damage were recorded in 8 of these children: transient hemiparesis in 5, permanent hemiparesis in 2 and gross mental retardation in 1.

CASE 2.—G. M., a girl, was born after a long labor, but there was no evident injury and development was apparently normal. Her mother had had many convulsions in a two week period in infancy but recovered uneventfully and had had no further convulsions since that time. At 10 months of age the patient had a convulsion lasting a few minutes, with a temperature of 103 F. At 11 months, she had repeated right-sided convulsions lasting twenty-four hours, with the temperature as high as 107 F. The elevation in temperature lasted four days. When she was seen two months and again eighteen months later, she had right spastic hemiparesis, right homonomous hemianopsia, slightly retarded development (at 27 months of age her developmental level was 24 months) and a left-sided abnormality on the electroencephalogram.

3. Moderately and Very Slow Electroencephalograms: These occurred in 13 children, or 5.4 per cent of the group. There were only two distinguishing clinical features about these children: age and duration of fever. All were under 3 years of age, and the percentage under 1 year of age was four times that in the normal group; the elevation in temperature lasted three days or more in all. The role of prolonged fever in producing electroencephalographic slowing (and pathologic changes in the brain) in infancy has been demonstrated experimentally.[9b]

4. Moderately and Very Fast Electroencephalograms: These were encountered in 13 children, or 5.4 per cent of the group. This type of abnormality occurred almost exclusively in boys. Mental retardation and late age of onset (after 3 years of age) were five and four times as common, respectively, as in the normal group, and an abnormal birth history was twice as common. The combination of a high incidence of abnormal deliveries and mental retardation suggested that the abnormally fast activity may be a post-traumatic phenomenon, i. e., related to injury at birth. It is known that fast activity may appear in the electroencephalograms of adults after head injury. When this occurs, epilepsy is apt to develop.[11] With a three year period of follow-up observation, 4 of 7 children with abnormally fast electroencephalograms had convulsions without fever.

CASE 3.—P. M., a boy 4 years 6 months of age, was referred for electroencephalographic study because of the occurrence of a febrile convulsion with "flu" at 4 years of age. A sister had febrile convulsions. He was born three weeks prematurely, with a weight at birth of 4 pounds 10 ounces (2,098 Gm.). His intelligence quotient was 59. When last seen, eighteen months later, he had had no further convulsions.

5. Paroxysmal Abnormalities (fig. 3): Such abnormalities occurred in 16 children, or 6.7 per cent of the series as a whole. This group of children showed clinical deviation from the normal group in many respects. All but 1 were over 3 years of age at the time their electroencephalogram was made, and the majority were 5 years of age or older. The age at onset was usually before 1 or after 3 years, with only about one third having the usual age at onset of 1 to 3 years. A single convulsion was not as common as in the group as a whole, and one third had three or more febrile convulsions. In more than half these children, a severe convulsion had occurred; half had an abnormal birth history; almost three times as many were mentally retarded as in the normal group. Finally, there was a higher incidence of a family history of isolated convulsions but especially of epilepsy and of convulsions on both sides of the family. This illustrates the fact that the development of epilepsy (or, in this case, of paroxysmal electroencephalographic abnormalities) is often attributable to many factors rather than to one.[12] The children in this group had evidence of a stronger hereditary factor than the normal group. They also showed evidence of many possible causes for pathologic changes in the brain: abnormal birth history, high incidence of convulsions before the age of 1 year

11. Roseman, E., and Woodhall, B.: Electroencephalogram in War Wounds of Brain, with Particular Reference to Post-Traumatic Epilepsy, A. Research Nerv. & Ment. Dis., Proc. (1944) **25**:200, 1946.

12. Lennox, W. G.: The Multiple Causes of Seizures in the Individual Epileptic Patient, New England J. Med. **209**:386, 1933.

and a high incidence of severe convulsions. Presumably, the increased incidence of mental retardation in this group is evidence of neurologic deficit resulting from the brain damage.

CASE 4.—J. St. A., a boy 4 years 3 months of age, was referred for electroencephalographic study because of developmental retardation. His past history

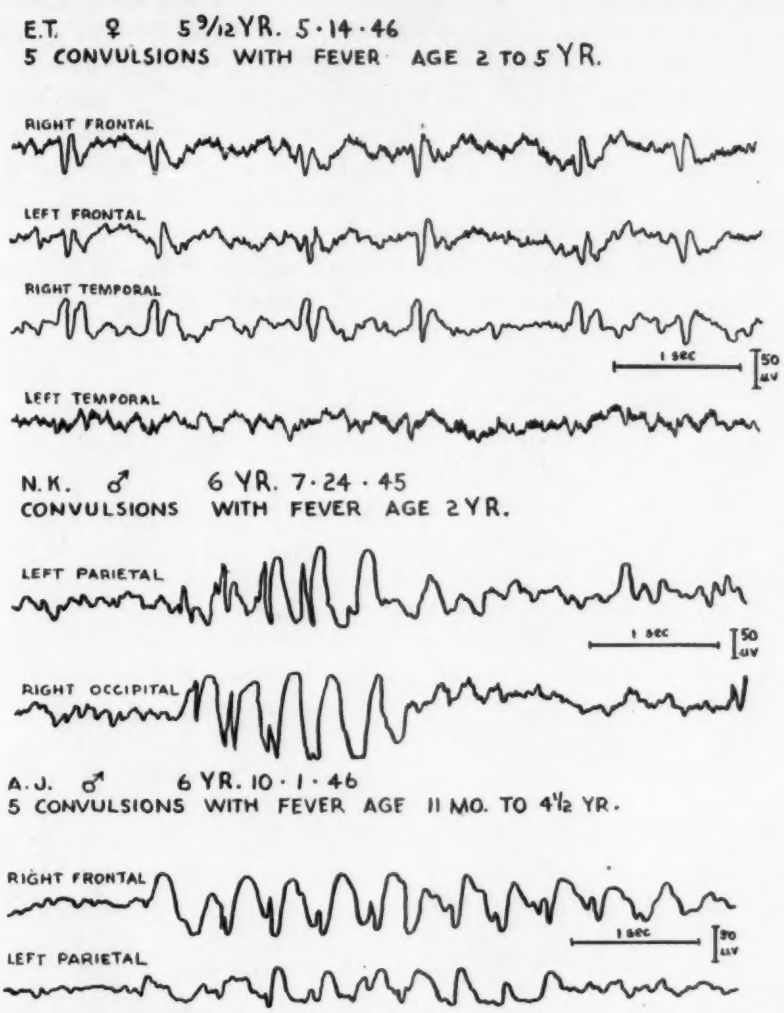


Fig. 3.—Several examples of paroxysmal abnormalities obtained on children with febrile convulsions.

revealed that he had had two or three half-hour convulsions at the age of 1½ years with a temperature of 104 F. He had four subsequent brief attacks with high fever to the age of 3 years, but none in the past year. The family history was positive in that the mother had had three convulsions in infancy, attributed to worms. A paternal cousin had convulsions with fever in infancy. The patient's

birth was premature at eight months. He had neonatal jaundice. His electroencephalogram showed rare 3 per second spike and wave complexes spontaneously and after hyperventilation.

D. Follow-up Data on the Children with Febrile Convulsions.—The maximum follow-up time on these patients was approximately three years. This is obviously too short a time to allow any over-all statement as to the development of epilepsy. For what they are worth, however, the observations are as follows.[13]

Methods: Several follow-up methods were utilized: 1. The charts of the group from the New Haven hospital were reviewed, and patients who came back to the hospital clinic or inpatient service because of convulsions were noted. Presumably, some did not come back in spite of further convulsions.

2. Thirty-eight patients who lived in accessible locations in the New Haven area were visited by student nurses [14] and were questioned concerning subsequent convulsions.

3. Letters were sent to the families of all patients hospitalized for febrile convulsions at the Children's Hospital of Boston in the past ten years. Dr. William G. Lennox made this material available.

Results: Of the 38 patients visited by the nurses, 2 had had convulsions without fever at 5 and 6 years of age, after a free period of three years and one year, respectively.

Of the 90 patients in the New Haven group, 11 were known to have had convulsions without fever.

Of the Children's Hospital group, 52 had had an electroencephalographic study. Of these, 5 were known to have had convulsions without fever. Ninety-five had no electroencephalogram made, and 4 of these have had convulsions without fever.

In summary, the various follow-up methods indicated that at the least 5 per cent, and at the most 12 per cent, of the children with febrile convulsions had convulsions without fever within a three year period. How many of these convulsions, too, will cease, and how many patients will have recurrent seizures after a longer period are unanswered questions.

More interesting is the possible prognostic value of the electroencephalogram. The 11 patients from the New Haven hospital, who are known to have had convulsions without fever, had electroencephalograms

13. Children who are known to have had seizures without fever as a precipitating factor were withdrawn from the file of febrile convulsions and data on them have not been included in the presentation to this point. Only the original group of 143 children have been followed long enough to be included in this follow-up survey.

14. Field, E.; Bonua, M., and Robinson, P.: Unpublished data. Thesis presented at the Yale University School of Nursing, October 1947.

made at the time convulsions were still febrile and before the onset of recurrent nonfebrile convulsions. The original electroencephalogram was normal in 4, abnormally fast in 3, extremely slow or focal in 2, moderately slow in 1 and paroxysmal in 1. This gives an incidence of recurrent nonfebrile convulsions within three years of 5 per cent for patients with a normal electroencephalographic tracing, 17 per cent for patients with a moderately slow tracing, 25 per cent for patients with a paroxysmal record, 33 per cent for patients with extremely slow or focal tracings and 50 per cent for patients with an abnormally fast record. Two children had a normal electroencephalogram at the time of febrile convulsions, later had convulsions without fever and at the ages of 5 to 7 years had paroxysmal abnormalities. Thus, abnormality may appear in a previously normal electroencephalogram with a change in the seizure status. Abnormality may also disappear, as has been mentioned.

Although these figures cannot be considered accurate for prognosis, they can be counted on to reflect the general trend. The prognosis is best when the electroencephalogram is normal; when it is abnormal, a fast electroencephalogram carries the worst prognosis, a moderately slow tracing is least serious and extremely slow, focal and paroxysmal abnormalities fall in between. In addition to the outlook with regard to further convulsions, one is concerned with neurologic sequelae, such as hemiparesis and retardation. One fourth of the children with extremely slow or focal electroencephalograms had such neurologic sequelae without (as yet) the complication of further convulsions.

COMMENT

These results are in general agreement with other clinical and experimental observations on the "natural history" of febrile convulsions. The occurrence of convulsions with fever is determined primarily by age (1 to 3 years), sex (male), heredity (family history of convulsions) and height of temperature (103 F. or over). The importance of rapidity of rise of temperature has been emphasized by others, but this factor could not be determined in the present study. These empiric observations have not been satisfactorily explained: the occurrence of the convulsions oftenest in boys, oftenest between 1 and 3 years of age and with a rapid change in temperature or with no fever.

Faerber [4c] stated that convulsions may occur with an abrupt fall, as well as with an abrupt rise, in temperature.

Neyroud [5] found fewer grossly abnormal electroencephalograms in this series than were found in the present group, presumably because of a different time interval between the acute illness and the recording.

More important than a delineation of the conditions under which febrile convulsions occur is an appraisal of short term and long term

consequences. By short term consequences, I refer to brain damage. It is known that convulsions may produce pathologic changes in the brain, especially in infants and children.[15] It is also known that fever may produce brain damage.[16] Unpublished observations suggest that this occurs most commonly in early infancy (i. e., in children under the age of 1 year), that the combination of long duration of fever and severe convulsions is most effective in producing pathologic changes and that extremely slow or focal electroencephalographic abnormalities are presumptive evidence that such a pathologic change exists.

This series is undoubtedly weighted with the more serious cases by virtue of the fact that an electroencephalogram was obtained. Many times only the children with severe convulsions are deemed worthy of admission to the hospital for treatment and diagnostic study. Forty per cent of the present group had severe convulsions, a much higher percentage than has been reported in any other series.

By long term sequelae, I refer chiefly to the chances that recurrent seizures without fever, or epilepsy, will develop. Any such estimate is extremely difficult to make. Thom,[2b] Patrick and Levy [2a] and Livingston, Bridge and Kajdi [3b] agreed that febrile convulsions are less apt to presage epilepsy than are other types of infantile convulsions, whereas I have suggested that the brain damage produced by a febrile convulsion is an additional hazard, increasing the chances of epilepsy.[17] The electroencephalogram is of definite prognostic assistance in children with febrile convulsions. To be of most assistance, it should be obtained within a week of the febrile convulsion and, if abnormal, should be repeated a week or two later.

I have been so impressed by the tragic consequences of febrile convulsions in some children (see cases 1 and 2) even without the sequela of epilepsy that I venture to propose a regimen aimed at the prevention of such sequelae. Let it first be emphasized that it is useless to suggest any such regimen without the full cooperation of the parents. They benefit by a clear explanation of febrile convulsions in general and of the management of the individual episodes.[14] The parents appreciate knowing that convulsions with fever are a common occurrence in children under 5 years of age, that almost all such children have no further convulsions in adult life and that the episodes themselves are almost always mild and do not harm the child. On the other hand, it is

15. Zimmerman, H. M.: The Histopathology of Convulsive Disorders in Children, J. Pediat. **13**:859, 1938.

16. Hartman, F. W.: Lesions of the Brain Following Fever Therapy: Etiology and Pathogenesis, J. A. M. A. **109**:2116 (Dec. 25) 1937.

17. Lennox, M. A.: Febrile Convulsions in Childhood: Their Relation to Adult Epilepsy, J. Pediat., to be published.

desirable to prevent such episodes, if possible, until the child is 3 or 4 years old. When a febrile convulsion does occur at home, the mother benefits by a knowledge of how to manage it.

Prevention of the sequelae of febrile convulsions has two aspects: prevention of the convulsions and treatment during the individual episodes.

In the prevention of febrile convulsions, I have relied on the regular administration of diphenylhydantoin sodium (dilantin®) and have observed that it is effective in reducing the number and severity of febrile convulsions. Since febrile convulsions rarely cause serious sequelae in children over 3 years of age, I have used prophylactic anticonvulsant medication only in children under 3 years old.

In the event of a febrile convulsion, every effort should be made to minimize the danger of brain damage. This may be done by eliminating the immediate cause of the convulsion (reduce the fever), shortening the convulsion (administration of paraldehyde intravenously [18]), preventing anoxemia (oxygen by mask) and preventing hemostasis (correct dehydration). Brown and his associates [19] reported a simple method for determining the specific gravity of plasma so that overhydration may be prevented.

SUMMARY AND CONCLUSIONS

Clinical and electroencephalographic studies on 240 children with febrile convulsions are reported.

Two thirds of all febrile convulsions occur in boys between 1 and 3 years of age. They almost always occur with a high fever, and half the children have a family history of convulsions, usually infantile or isolated. Forty per cent of the children in this group had a severe convulsion.

The electroencephalogram was normal in 71 per cent. An abnormal electroencephalographic record increases the likelihood that recurrent convulsions without fever or epilepsy will develop. From clinical correlates the following conclusions are drawn in regard to the significance of electroencephalographic abnormalities.

1. An abnormally fast tracing is often correlated with a history of traumatic birth, and 50 per cent of these children had recurrent nonfebrile convulsions within a three year period.

---

18. de Elío, F. J.; de Jalón, P. G., and Obrador, S.: Some Experimental and Clinical Observations on the Anticonvulsive Action of Paraldehyde, J. Neurol., Neurosurg. & Psychiat. **12**:19, 1949.

19. Brown, H. R.; Clark, W. F.; Jones, N.; Walther, J., and Warren, S. L.: The Relationship of Dehydration and Overhydration of the Blood Plasma to Collapse in the Management of Artificial Fever Therapy, J. Clin. Investigation **22**:471, 1943.

2. An extremely slow or focally abnormal electroencephalogram suggests pathologic changes in the brain caused by the febrile convulsion. A moderately or very slow record suggests less severe involvement. Recurrent nonfebrile convulsions occurred respectively in 33 and 17 per cent of these children within a three year period.

3. A paroxysmal electroencephalographic abnormality tends to occur in children with both genetic and traumatic factors predisposing to epilepsy, and 25 per cent had recurrent nonfebrile convulsions within a three year period.

Consequences of febrile convulsions, although not occurring in more than an estimated 10 to 15 per cent of patients, may be severe enough to warrant energetic measures to prevent febrile convulsions and their consequences.

Miss Margaret Hulburt, assistant professor of neuropsychiatric nursing, Yale University School of Nursing, counseled the student nurses who gathered the follow-up information reported here. Miss Olga Noto obtained most of the electroencephalograms reported on here and tabulated the data.

333 Cedar Street.

ACUTE RESPIRATORY DISORDERS AMONG NEWBORN INFANTS IN OBSTETRIC NURSERIES

Experience in New York City, 1940 to 1948

HAROLD ABRAMSON, M.D.
NEW YORK

SEVERAL years ago,[1] a study was published on the role played by the surgical mask in prevention of respiratory disorders among newborn infants in nurseries of lying-in hospitals. After that report, communications were received questioning whether respiratory disorders constitute a danger in obstetric nurseries. Statements were made to the effect that outbreaks of respiratory disorders, especially the milder forms, are unusual among newborn infants, and that these babies require possibly ten days or more for sensitization to infectious agents, including colds and other respiratory ailments. Opinions were also advanced that agents responsible for these disorders in older children or adults may possibly cause symptoms of intestinal infection in newborn infants.

REVIEW OF THE LITERATURE

General Observations.—A search of the literature gave little information on the susceptibility of newborn infants to the acute respiratory disorders. Brennemann [2] stated that a definite degree of immunity to lobar pneumonia and bronchopneumonia is present during the first three months of life and that outbreaks of respiratory infections are almost unknown among newborn babies. Finkelstein was cited as stating that the duration of this immunity is *gerade drei Monate*—exactly three months.

Smith [3] pointed out that the newborn infant receives passive immunization to certain infectious diseases from its mother. Immunity is

From the Bureau of Preventable Diseases, New York City Department of Health, and from the Department of Pediatrics, New York Medical College, Flower and Fifth Avenue Hospitals.

1. Abramson, H.: The Rôle of the Surgical Mask in the Prevention of Cross-Infection in Hospital Nurseries for Newborn Infants, J. Pediat. **24**:684 (June) 1940.

2. Acute Infections of the Lungs and Air Passages, in Brennemann, J.: Practice of Pediatrics, Hagerstown, Md., W. F. Prior Company, Inc., 1937, vol. 2, chap. 48, p. 10.

3. Smith, C. A.: Neonatal Immunology, in the Physiology of the Newborn Infant, Springfield, Ill., Charles C Thomas, Publisher, 1945, chap. 13, pp. 280-297.

considerable against measles and diphtheria, less against the streptococcic, pneumococcic and staphylococcic infections and influenza and negligible against whooping cough. According to several investigators,[4] antibodies to influenza in newborn infants parallel those in the mother.

Collins[5] pointed out that there is little information on the trends of illness in the first year of life. Five periodic surveys were made of illness among families in different communities. In infants under 1 month of age the annual case rate of coryza and colds was 214.3 per 1,000 infants. The annual case rates per 1,000 infants of other respiratory diseases were as follows: whooping cough, 68.9; pneumonia (all forms), 45.9; bronchitis, 45.9; influenza, 23.0; pharyngitis, tonsillitis, laryngitis and sore throat, 7.7. A breakdown according to weeks under 1 month of age was not available.[6]

Outbreaks Reported.—Few outbreaks have been reported of acute respiratory disorders among newborn infants in obstetric nurseries. In 1935, Smith[7] described an outbreak of fatal staphylococcic pneumonia in 4 newborn babies, 11 to 13 days of age. The duration of illness averaged two days. Postmortem examination disclosed staphylococcic pneumonia in 2 babies. Six of the exposed infants had catarrhal symptoms. Profuse growths of Staphylococcus aureus were obtained from cultures of nasopharyngeal secretions.

In 1936, Conklin[8] published a report of an outbreak among newborn infants of pneumonia accompanied with pustular cutaneous lesions. Thirty-eight babies, 1 to 20 days of age, became ill among 341 at risk during July and August 1930, with 10 deaths. Sneezing, nasal discharge, temperature 100 to 102 F. and respiratory distress were present. Moist rales and bronchial breathing were heard in the lungs. Postmortem examinations showed pulmonary lesions ranging from capillary

---

4. Francis, T., Jr., and Magill, T. P.: The Incidence of Neutralizing Antibodies for Human Influenza Virus in the Serum of Human Individuals of Different Ages, J. Exper. Med. **63**:655 (May) 1936. Rickard, E. R., and Horsfall, F. L., Jr.: The Relationship Between Neutralizing Antibodies Against Influenza A Virus in the Sera of Mothers and Infants, J. Immunol. **42**:267 (Nov.) 1941. Cohen, P., and Schneck, H.: Natural Incidence of Influenza Antibodies in Children of Different Age Groups, J. Pediat. **32**:154 (Feb.) 1947.

5. Collins, S. D.: Illness Among Infants with Comparative Mortality Data, Pub. Health Rep. **63**:637 (May 14) 1948.

6. Collins, S. D.: Personal communication to the author.

7. Smith, C. M.: Staphylococcal Pneumonia Among Infants in a Hospital, Lancet **1**:1204 (May 25) 1935.

8. Conklin, C. B.: A Sporadic Outbreak of Neonatal Pneumonia with Accompanying Skin Lesions Due to Staphylococcus Albus Hemolyticus, M. Ann. District of Columbia **5**:264 (Sept.) 1936.

bronchitis to bronchopneumonia with multiple abscesses. Staphylococcus albus hemolyticus was recovered from the pus.

In 1938, Dickie [9] reported an outbreak of an acute respiratory disorder in which 7 newborn infants, among 56 at risk, became ill during the course of a month and 2 died. The ages varied from 10 to 15 days. The incubation period averaged five days. The onset of illness was gradual. Staph. aureus was recovered on culture of the nasopharyngeal secretions of 5 sick babies. The symptoms consisted of paroxysms of cough, cyanosis and severe dyspnea, pyrexia ranging up to 102.5 F. and lasting one to nine days and continuous expulsion through the nose and mouth of a copious white, frothy secretion. The lungs showed bronchitis to massive consolidation. The duration of illness was two to nine days, the average being six days. In the 2 fatalities, death occurred on the fourth and fifth days of illness. The source of the infection was not definitely determined. Several carriers of staphylococci were found among the nurses and mothers.

Adams [10] reported an outbreak of primary virus pneumonitis in which 32 babies, 20 to 90 days of age, became ill from January to March 1937, with 9 deaths. Two additional outbreaks were subsequently reported in babies between the ages of 21 and 56 days, with mortalities of 8 and 14 per cent in full term babies and 83 per cent in premature infants.[11] A further report discussed congenital pneumonitis in newborn infants.[12]

Cough, dyspnea, cyanosis, low grade fever, listlessness and apathy were present. Coarse rales were heard in the lungs and bronchopneumonia was seen on roentgenography. Otitis media complicated the clinical course in some instances. Illness lasted two weeks in the infants who survived and one week in those who died. At necropsy, the lungs showed edema, hemorrhage, atelectasis, mononuclear cell infiltration, cytoplasmic inclusion bodies in the bronchial epithelium, necrosis and sloughing. The presence of cytoplasmic inclusion bodies in stained epithelial cells of pharyngeal smears was considered diagnostic, but

9. Dickie, A. E.: Outbreak of Acute Respiratory Infection in a Neonatal Ward, Lancet **1**:139 (Jan. 15) 1938.

10. Adams, J. M.: Primary Virus Pneumonitis with Cytoplasmic Inclusion Bodies: Study of an Epidemic Involving Thirty-Two Infants with Nine Deaths, J. A. M. A. **116**:925 (March 8) 1941.

11. Adams, J. M.; Green, R. G.; Evans, C. A., and Beach, N.: Primary Virus Pneumonitis: A Comparative Study of Two Epidemics, J. Pediat. **20**:405 (April) 1942. Adams, J. M.: A Third Epidemic of Primary Virus Pneumonitis Among Infants in Minnesota, Journal-Lancet **65**:192 (May) 1945.

12. Adams, J. M.: Congenital Pneumonitis in Newborn Infants, Am. J. Dis. Child. **75**:544 (April) 1948.

because of the ubiquity of these bodies, interpretation of their significance was made with caution.[13]

Pharyngeal cultures from infants, mothers and personnel of the maternity service, as well as blood cultures from the infants, gave no conclusive results. Virus cultures and ferret inoculations for influenza were unsuccessful. Throat washings from sick infants instilled into the respiratory tracts of newly born calves produced respiratory disease. Smears from the respiratory passages showed inclusion bodies. No neutralization tests were made. A virus causation was postulated for the disorder because of the contagiousness of the disease, its species and tissue specificity and its definite predilection for premature and young infants.

Bacteriologic Studies.—Investigations of the bacterial flora of the respiratory tract of infants are also few. Kneeland[14] showed that the characteristic flora of the upper respiratory passages is acquired by full term infants in the first two weeks of life. Significantly absent are pneumococci, hemolytic streptococci and influenza bacilli. On initial cultures of material from the throat 80 per cent of the newborn infants showed no growth of organisms until after the first feeding. Subsequently, the predominating organism was the nonhemolytic streptococcus (60 per cent), with Staph. albus next in frequency (27 per cent). Nasal secretions of 85 per cent of the infants showed no growth on the first postnatal day and those of 40 per cent no growth on the second day. On the first positive culture, Staph. albus was the predominating organism (76 per cent). Results similar to those of Kneeland for full term babies were subsequently obtained for premature infants by Torrey and Reese.[15]

Cornelison, Johnson and Fisher[16] made cultures of material from the oral and nasal cavities of newborn infants immediately following delivery before aspiration of mucus. Staphylococci, the enterococcus group of streptococci (Str. faecalis) and candidae were observed in numbers similar to those in the vaginal tract of pregnant women. Escherichia coli was isolated in a higher percentage than previously

13. Adams, J. M.: Common Respiratory Tract Infections in Infants, J. Pediat. **33**:499 (Oct.) 1948; Pneumonitis in Infancy, J. A. M. A. **138**:1142 (Dec. 18) 1948.

14. Kneeland, Y., Jr.: Studies in the Common Cold: III. The Upper Respiratory Flora of Infants, J. Exper. Med. **51**:617 (April) 1930.

15. Torrey, J. C., and Reese, M. R.: Initial Bacterial Flora of Newborn (Premature) Infants: Nature, Source and Relation to Ultraviolet Irradiation and Face Mask, Am. J. Dis. Child. **67**:89 (Feb.) 1944; Initial Aerobic Flora of Newborn Infants: Selective Tolerance of Upper Respiratory Tract for Bacteria, ibid. **69**:208 (March) 1945.

16. Cornelison, J. L.; Johnson, E. A., and Fisher, W. M.: Bacteriology of the Oronasal Cavity of the Newborn, Am. J. Obst. & Gynec. **52**:797 (Nov.) 1946.

reported for pregnant women. A direct correlation was found between the length of time of rupture of membranes prior to delivery and the frequency with which organisms were isolated in the oropharynx of the babies.

OUTBREAKS OF RESPIRATORY DISORDERS OBSERVED IN LYING-IN HOSPITALS OF NEW YORK CITY

In the course of routine investigations of epidemics of disease in nurseries of the newborn, seven outbreaks of respiratory infections have been encountered. In these outbreaks, there were 285 babies at risk, with 71 cases and 19 deaths. The over-all morbidity was 24.9 per cent, the mortality 6.7 per cent and case fatality 26.8 per cent. The following five outbreaks will serve as illustrations. Many of the infants who became ill were under 2 weeks of age, or in the period when respiratory disorders are stated to be unusual. In addition, diarrhea was not a prominent accompanying symptom. In fact, it was absent in the majority of instances.

I. Outbreak of Mild Respiratory Infection, Possibly Due to Hemolytic Streptococci.—A 10 day old premature baby, weighing 964 Gm., died in a nursery for premature babies on Nov. 22, 1946, from bronchopneumonia. The diagnosis was verified by postmortem examination. A second premature infant, weighing 1,077 Gm., became ill with respiratory symptoms on November 24, at 22 days of age, but was discharged home well after one month of illness. There were 16 premature infants at risk; only 2 were infected.

On November 24, 3 full term infants, among 17 at risk in a second nursery on another floor, exhibited respiratory symptoms. On November 25, 26 and 29, 3 additional infants became ill. Spread of the infection to a group of 18 infants on still another floor occurred on November 28, when 6 became ill, to be followed by 3 more on the following day. The ages of the babies ranged from 2 to 6 days.

Symptoms were sniffles, nasal discharge and temperatures ranging from 100 to 102 F. for two to three days. Only 3 of the entire sick group of 17 babies had transient diarrheal stools. Except in the premature baby who died from bronchopneumonia, physical examination disclosed only reddened throats. Dehydration was minimal and losses in weight averaged about 150 Gm. The duration of illness averaged four days in the full term babies. Cultures of material from the nose and throat grew hemolytic streptococcus in 2 babies and Staph. aureus in 2 other babies. Fecal cultures showed no enteric bacterial pathogens.

Among the mothers, physicians, nurses and other personnel on the maternity service, only one nurse in the nursery for premature infants was observed with signs of a cold. This nurse gave, on November 27,

a throat culture yielding hemolytic streptococcus. A culture on December 22 was negative. Nose and throat cultures were taken from November 22 to 29 of all nurses who had cared for babies in nurseries 1, 2 and 3. Eight additional nurses in nursery 1 for premature infants gave cultures yielding hemolytic streptococcus. Only one positive culture was obtained from the personnel in nursery 3 and none in nursery 2. Two resident physicians showed positive nose and throat cultures for hemolytic streptococci. No cultures were made of the nasopharyngeal secretions from the mothers and other persons on the maternity service. The hemolytic streptococci isolated were not grouped. Their relationship to the outbreak of respiratory disorders in the infants is, of course, open to question. The pathway of spread of infection from one nursery to another could not be traced. All that can be stated is that the nursing and medical personnel on duty shifted from one floor to another.

II. Outbreak in a Group of Premature Infants of an Acute Respiratory Disorder, Type Undetermined.—On May 20, 1946, among a group of 20 premature infants, 6 became ill with a respiratory infection. Four more became similarly ill later. The infants ranged from 10 to 52 days of age, with an average of 21 days. Their mean weight was 2,000 Gm. The duration of illness was thirteen days.

The clinical course was severe in only 2 instances. One baby, a 19 day old premature infant weighed 1,984 Gm. Illness developed on May 20 and was complicated by purulent otitis media. The baby was discharged from the hospital on June 1 but was readmitted two weeks later with bronchopneumonia and purulent otitis media. Staph. aureus and hemolytic streptococcus were isolated from the throat and the aural discharge. The baby recovered. The other baby, a 10 day old premature infant weighing 2,070 Gm., died on the first day of overt illness. on May 26. Postmortem examination disclosed diffuse bronchopneumonia.

The remaining 8 babies had mild to moderate respiratory symptoms, such as temperature of 100 to 102 F., reddened throats and mucopurulent nasal discharge. Feedings were taken well. Except in the infant who died, body weights were maintained satisfactorily. It is of interest that loose or diarrheal stools were not present in any of the sick babies. Bacteriologic investigations were not carried out. The origin of the infection was not determined.

III. Outbreak of a Severe Respiratory Infection (Possibly Bronchopneumonia) of Undetermined Type.—On Jan. 17, 1945, 5 infants in a group of 26 became ill. Three died, 2 on the first day of overt illness and the last on the third day. The ages ranged from 6 to 8 days. The duration of illness in the 2 who recovered was three and five days.

Onset of illness was abrupt, with temperatures of 102 to 104 F. Signs of involvement of the respiratory tract consisted of cyanosis and dyspnea, reddened throats and rales in the chest. Severe dehydration occurred in 2 of the babies who died. Losses in weight amounted to 800 and 900 Gm. There was only 1 instance of diarrhea. No evidence of infection of the skin or umbilical cord was present. There were no neurologic signs. Roentgenographic examination of 1 baby showed clear pulmonary fields. No bacteriologic investigations were made. Postmortem studies of 1 of the infants showed diffuse bronchopneumonia. Attempts to trace the origin and pathway of spread of the infection gave no suggestive information.

IV. Outbreak of Pneumonia (and Sepsis?) Possibly Due to Staph. Aureus.—This outbreak began on Oct. 7, 1940, among the babies in the nursery for premature infants and spread to the babies in the nursery for full term infants on October 20. The last baby became ill on December 6. By that time, 134 infants had been exposed and 24 had been taken ill, with an attack rate of 17.7 per cent. There were 13 deaths, with a mortality of 9.6 per cent and a case fatality of 54.1 per cent. The premature babies bore the brunt of the outbreak. Of 12 who were at risk, 11 became severely ill and 9 died. The ages of the 24 babies at the time of the onset of illness ranged from 1 to 30 days, with an average of 15 days. Thirteen were under 8 days old.

Onset of illness was acute with temperatures of 101 to 106 F. Cyanosis, dyspnea and a profuse mucopurulent nasal discharge were prominent. Vomiting occurred occasionally. About half the babies passed diarrheal stools. One infant had convulsions. Seven babies had pyogenic lesions of the skin, ranging from small furuncles to large subcutaneous abscesses. Red throats were common. The lungs revealed diffuse bronchopneumonia. Determinations of the carbon dioxide–combining power of the blood showed values ranging from 5.3 to 14.5 volumes per cent. The duration of illness averaged twenty days in those who recovered and eleven days in those who died.

Staph. aureus was grown on cultures of matter from the cutaneous lesions, the nasopharyngeal discharges, the stools and the urine of the babies. Also isolated from the stools and urine were Streptococcus viridans, Bacillus subtilis and coliform bacteria. Gross postmortem examinations of 13 babies showed diffuse bronchopneumonia in 9 and lobar pneumonia in 1 other. Multiple abscesses of the lungs were seen in 3 babies, 2 of whom showed suppurative pleuritis. Confirmatory microscopic examinations were made in only 2 cases. Additional evidence of pyemia was seen in the following lesions from which Staph. aureus was isolated: renal abscess, myocardial abscess, purulent meningitis, suppurative mastoiditis and gangrene of the hand and foot.

Evidence of wasting was seen in the presence of marantic ulcers of the esophagus, stomach and intestine in 5 babies, 4 of whom were premature.

The source of the outbreak was not determined. One mother who nursed her baby had an abscess of the breast. Her baby, a full term infant, became ill on October 21, early in the outbreak, but recovered after a stormy course. Staph. aureus was recovered both from the throat of the infant and from the abscess of the breast. Another nursing mother also had a breast abscess. Her infant became sick on November 16 but recovered after five weeks of illness. Staph. aureus was isolated from the abscess of the breast and from the nose, throat, stools and urine of the baby. In a third mother a purulent infection of a cesarean section wound developed. Her premature infant, who had furunculosis, also became ill on November 16, with recovery taking place after nine days. Staph. aureus was grown on cultures of the discharge from the wound and the nasopharyngeal secretions of the baby.

Six nurses who had taken care of the babies and mothers had been excused from duty for infections of the upper respiratory tract from October 1 to November 6. Two other nurses were reported ill with sinus infections, and another nurse was taken off duty with a sore throat. A direct relationship between illness in these persons and the disease in the infants was not demonstrated.

V. Outbreak of Ulcerative Stomatitis and Bronchopneumonia, Cause Undetermined.—This outbreak, with onset July 21, 1940, appeared to begin as one of thrush. Smears and cultures were made but did not show Candida albicans. The local condition soon changed to that of a severe ulcerative process involving the gingival, palatal and buccal mucous membranes and the upper surface and edges of the tongue. The ulcers, discrete and coalescent, were embedded in an adherent grayish white membrane with a rough surface that bled easily on manipulation. The posterior pharyngeal wall was severely red. Fevers were low grade. Feeding was a great problem. Cultures yielded no known bacterial pathogens. The oral lesions did not respond to the usual methods of local treatment. Six babies of a group of 12 showed this initial clinical picture. Their ages were 1 to 8 days.

Symptoms of respiratory involvement became evident on an average of ten days later, with temperatures of 103 to 104 F., dyspnea and cyanosis. Physical examination in each instance showed bronchopneumonia, subsequently confirmed by roentgenography. Two babies died. Postmortem examinations revealed the following, in addition to the stomatitis: laryngotracheobronchitis, bronchopneumonia, esophagitis, otitis media and fibrinous pleurisy. The nature, origin and method of spread of the infection were not determined.

COMMENT

It is not my intention to draw conclusions from the little information that has been culled from the literature and from the few examples of outbreaks of respiratory disorders in newborn infants that have been studied in the field. The material is presented to stimulate discussion and to evoke reports by other observers on their experiences with the problem.

Nevertheless, the data suggest that in certain circumstances newborn infants are vulnerable to acute respiratory ailments, either of bacterial or of viral origin. The extent of this susceptibility still remains a problem for investigation. Evidence is also presented to indicate that infants even under 2 weeks of age are liable to attack, and that diarrhea does not necessarily accompany acute respiratory disorders in newborn infants.

The material presented consists of data on outbreaks of moderate to major severity, with fatalities. The respiratory picture in two outbreaks may properly be considered complications of a primary infection (outbreaks IV and V). But what about outbreaks of the minor respiratory disorders, without fatalities, such as are characterized by colds and coryza? Do they occur among newborn infants in lying-in hospital nurseries? If so, what are the circumstances under which these minor disturbances take place and what are the ages of the infants who are attacked? How do they react and what symptoms and signs are shown?

At present, no examples of such outbreaks are available for study either in the literature concerned with these disorders or from personal experience in the field. Is it because outbreaks of this type do not occur? Or, is it because these minor disorders are not considered of any particular significance and are, therefore, not described in the literature? It should also be noted that they are not conditions reportable to local health officers for investigation. Therefore, there is no direct method of gaining knowledge of their existence. From the observations of Collins,[5] it appears that respiratory infections of the minor form occur with greater frequency during the neonatal period than is commonly supposed.

At any rate, the need is evident for further study of the acute respiratory disorders of newborn infants. More complete clinical, bacteriologic and immunologic investigations are required. Clarification of the problem is essential for the prevention of communicable diseases in the nurseries of obstetric hospitals.

145 East Sixty-First Street (21).

HYPERTROPHY OF THE COLLICULUS SEMINALIS IN CHILDHOOD

Report of Eighteen Cases

S. HARRIS JOHNSON III, M.D.
Instructor in Urology
AND
WALTER C. PRICE, M.D.
Teaching Fellow in Pediatrics
PITTSBURGH

BENIGN hypertrophy of the colliculus seminalis (verumontanum) has been described in the medical literature only as it affects the male adult. Since 1946, one of us (S. H. J.) has recorded the incidence and clinical manifestations of benign hypertrophy of the colliculus seminalis in infants and children admitted to the urologic service of the Children's Hospital. This condition is distinct from congenital hypertrophy, a rare pathologic entity occurring in newborn infants.[1] Neither should benign hypertrophic change be confused with verumontanitis, which has been noted briefly as a complication of urinary tract infection in the young male child.[2]

So many causes have been blamed for, and such a variety of symptoms has been associated with, this condition in the adult[3] that our study is particularly concerned with observations on the effects enlargement of the colliculus seminalis has on urinary and sexual habits in the pediatric age group. Our observations indicate that such hypertrophy, especially when associated with inflammation or new growth on its surface, produces an irritation causing primarily reflex sexual or bladder stimulation, whereas in the adult such hypertrophy has been attributed largely to sexual aberration or chronic infection of the posterior portion of the urethra.

From the Department of Urology and the Department of Pediatrics of the Children's Hospital, University of Pittsburgh Medical Center.

1. Bugbee, H. G., and Wollstein, M.: Surgical Pathology of the Urinary Tract in Infants, J. A. M. A. **83**:1887 (Dec. 13) 1924; Retention of Urine Due to Congenital Hypertrophy of the Verumontanum, J. Urol. **10**:477, 1923. Baldridge, R. R.: A Case of Congenital Hypertrophy of the Verumontanum, New England J. Med. **213**:46, 1935.

2. Campbell, M. F.: Pediatric Urology, New York, The Macmillan Company, 1937, vol. 2, p. 134.

3. Strauss, A.: Diseases of the Colliculus Seminalis, Cleveland M. J. **15**: 636, 1916.

In order to understand the symptoms which characterize benign hypertrophy of the colliculus seminalis, a brief review of the embryologic, anatomic, physiologic and histopathologic characteristics of the organ is necessary.

EMBRYOLOGIC DEVELOPMENT

The urethral crest presenting the colliculus seminalis in its mid-portion is the only persisting embryonic remnant of Müller's tubercle in the male adult.[4] It begins to develop about the fourteenth week of fetal life due to the upward growth of the ejaculatory ducts and a sac-like glandular structure, the future sinus pocularis. Into the colliculus seminalis, forming its main bulk, opens the sinus pocularis, or utricle, which is formed by fusion of the distal portions of the müllerian ducts and is the homologue of the uterus.[5]

ANATOMIC DESCRIPTION

The colliculus seminalis is 0.4 cm. high, a small, rounded, oval, elliptic or conic elevation of the urethral mucosa arising from the floor of the prostatic portion of the urethra, clearly defined against the background of the posterior urethral wall as visualized through the cystourethroscope. It is honey yellow and has a superior surface tinged pink by underlying superficial vessels. Watson noted that the colliculus seminalis varies greatly in size and consistency in infancy.[6]

The sides of the organ rise steeply toward its peak, its greatest height and width being at the point where the ejaculatory ducts and utricle open into the urethra, which is usually about 0.2 cm. below its upper end. It is separated by the deep valleys of the sulci laterales from the flanking walls of the urethral canal. The proximal face falls sharply away from the peak, spreading at its lower end and blending with the floor of the membraneous part of the urethra. On the anterior surface, or occasionally on the superior surface, there is a reddish, small, round crescentic or slitlike opening, the utricular orifice. Usually on either side or slightly below this lie the minute mouths of the ejaculatory ducts.

HISTOLOGIC ASPECTS

The sinus pocularis, which forms the bulk of the colliculus seminalis, is a glandular organ separated from the prostate by a firm, fibrous capsule. Histologically, there are recognized (1) elastic, (2)

4. Watson, E. M.: Development of the Human Verumontanum, Bull. Johns Hopkins Hosp. **29**:241, 1918.

5. Jordan, H. E., and Kindred, J. E.: Textbook of Embryology, ed. 5, New York, D. Appleton-Century Company, Inc., 1948, p. 24.

6. Watson, E. M.: The Colliculus Seminalis at Birth, J. Urol. **3**:269, 1919.

muscular and (3) acinar elements in the organ.[7] An interglandular elastic stroma, arising in and forming part of the sinus wall, separates the glandular acini. This stroma resembles that of the prostate in that it contains fibrous connective tissue and many strands of elastic tissue interlaced with a few muscular fibers. On the surface of the colliculus seminalis this thin layer of smooth muscle supports the epithelium, which is a direct extension of the urethral mucosa. The muscle extends anteriorly, posteriorly and laterally, merging with the smooth musculature of the urethral floor. The acini vary considerably in number, size and shape; they open by small channels into a common duct which is 1 to 2 cm. in depth. These glands are both simple and racemose. Their base is composed of flattened connective tissue cells on which rest the columnar or cuboidal cells of the acini. The cell nuclei are small and round, and the cytoplasm is clear. Corpora amylacea are occasionally enclosed within their lumens. The common duct, which ordinarily pursues an oblique course through the sinus pocularis, is lined by the same type of epithelium as the acini.

PATHOLOGIC CHANGES

In the soft, infiltrated lesion described as typical of benign hypertrophic change in the colliculus seminalis of the child, the urethroscope visualizes a swollen, congested, dull red, lusterless hillock whose wrinkled surface bleeds readily on being touched. The utricular orifice is inflamed and gaping; the mouths of the ejaculatory ducts may appear swollen. On the superior surface of the gland there may also be seen small cysts or minute ulcerations. In simple hyperemia or edema of the colliculus seminalis there is considerable vascular congestion present with excess serum distending the tissue spaces. Grossly the colliculus seminalis may be so enlarged that it practically occludes the lumen of the urethra.[8]

PHYSIOLOGIC ASPECTS

It is only recently that the physiologic aspect of the colliculus seminalis has been clearly understood. The organ functions (1) mechanically and (2) sexually. Mechanically, it acts in the mature male as a simple director of the seminal stream. The sexual role of the colliculus seminalis has long been related to the sexual impulse and act. In the adult, the hypertrophic organ has been blamed for

7. McCarthy, J. F.; Ritter, J. S., and Klemperer, P.: Anatomical and Histological Study of the Verumontanum with Especial Reference to the Ejaculatory Ducts, J. Urol. **17**:1, 1927.

8. Swineburne, G. W.: Diseases of the Verumontanum as a Cause of Urinary Obstruction, J. Urol. **6**:288, 1910.

sexual impotence; its atrophic state has been attributed to prolonged onanism, and localized hyperemia has been attributed to sexual excess or aberration.

There are no erectile tissue, large vessels or special nerve endings in the substance of the colliculus seminalis. However, the prostate, prostatic portion of the urethra and urethral mucosa are so richly supplied with nerves from the sacral plexus, which pass in intimate relation to the hypogastric and sympathetic fibers, that this may be the reason irritation secondary to inflammation of these organs should be transmitted to neighboring nerve groups. This may well account for the symptoms and neuroses related to verumontanitis or even to benign hypertrophy of the colliculus seminalis.

HYPERTROPHY OF THE COLLICULUS SEMINALIS IN THE ADULT

In writing of symptoms attributable to lesions of the colliculus seminalis in the adult, Pennock [9] enumerated an exhaustive list of complaints noted in patients with verumontanitis. Hematuria was associated with this condition by Rosen.[10] Thomas and Hubbell [11] reported a series of 40 cases in which lesions of the colliculus seminalis were stressed as an important cause of enuresis; these patients all were relieved by electrofulguration. As early as 1922, Browdy [12] reported on sexual neuroses stemming from inflammation of the colliculus seminalis. In 1929, Begg [13] first described a case of benign hypertrophy of the gland in a child. However, this condition is here described for the first time as a clinical entity of urologic significance in childhood. Our series also emphasizes how often in infancy the presence of polyps or cystic changes may be associated with enlargement of the colliculus seminalis.

In reviewing the literature, we note emphasis on urinary obstruction, persistent urethral inflammation or sexual aberration as causes of the chief symptoms in lesions of the colliculus seminalis in the adult. These have been said to arise from coitus interruptus, ungratified sexual desire or masturbation. From study of our series it appears, that all

---

9. Pennock, W. J.: Verumontanitis, J. A. M. A. **65**:1167 (Oct. 15) 1915.

10. Rosen, R.: The Verumontanum and Its Relation to Hematuria, Nocturnal Emissions, and Its Treatment, J. Michigan M. Soc. **21**:123, 1922.

11. Thomas, B. A., and Hubbell, R. J.: Enuresis Nocturna: An Analysis of Forty Cases Stressing Lesions of the Verumontanum as a Cause, J. Urol. **26**:107, 1931.

12. Browdy, M. W.: Chronic Disease of the Verumontanum and Sexual Neurosis, Lancet **2**:961, 1922.

13. Begg, R. C.: The Verumontanum in Urinary and Sexual Disorders, Brit. J. Urol. **1**:237, 1929.

symptoms in children are secondary to local pathologic changes affecting the hypertrophic or inflamed organ. Such etiologic factors as sexual abuses or venereal disease can be virtually eliminated as causes of this entity in the pediatric patient.

ANALYSIS OF CASES

The table lists the presenting complaints, laboratory findings, pathologic changes and operative procedures, together with other pertinent data, on a series of 18 consecutive cases of hypertrophy of the colliculus seminalis and associated lesions. The patients ranged in age from 8 months to 13 years and included 8 Negro and 10 white children.

Symptomology.—The most commonly tabulated complaints included dribbling of urine, enuresis, hematuria, frequency, stranguria and pain referred to groin, genitals, flank or bladder. In those patients referred for masturbation in whom there were pathologic changes of the colliculus seminalis, complete relief followed fulguration of the organ. In cases complicated by polyps or cysts or huge glandular hypertrophy, the ball-valve action of the swollen organ resulted in transient obstruction of the posterior part of the urethra, associated with inflammation and severe discomfort. Terminal hematuria was described by several patients who had hemorrhagic cysts of the engorged colliculus seminalis.

Diagnosis.—Every patient referred to the outpatient department of the Children's Hospital with complaints relative to sexual abuse, dysuria, enuresis, hematuria or urinary incontinence received a thorough urologic study. Children complaining of vague but persistent pain in the groin, flank or lower part of the abdomen also were regarded as potential urologic problems. Patients with characteristic symptoms of urologic disease were investigated as a matter of course. Our studies included a careful examination of renal, vesical and genital areas, laboratory analysis of specimens of catheterized urine and cystoscopy with retrograde pyelography.

Treatment.—As illustrated by this series, fulguration of the hypertrophic colliculus seminalis is the treatment of choice. It relieves pseudo-obstruction, removes new growth and effects prompt symptomatic relief. Such treatment has long been accepted in therapy of this condition in the adult. In our experience use of silver nitrate solutions for cautery has proved only a palliative measure. Cystoscopy without fulguration also is valueless. An associated verumontanitis is no contraindication to fulguration. In those patients having cultures of urine yielding pathogens, treatment of the hypertrophic organ by electrocautery, together with appropriate chemotherapy or antibiotic therapy, has rapidly cleared the bacteriuria.

Hypertrophy of the Colliculus Seminalis and Associated Lesions: Summary of Eighteen Cases

Case No.	Age	Chief Complaints	Physical Findings	Laboratory Findings	Cystoscopy Findings	Operation	Results
1	5½ yr.	Genital aching; dysuria; blood dripping from penis (8 days)	Negative	Hemolytic Staph. aureus in urine	Severe hypertrophy of colliculus seminalis; multiple hemorrhagic polyps on vertex	Fulguration of polyps and posterior vesicle neck	Complete relief
2	3 yr.	Stranguria; dysuria; frequency; hematuria (3 days)	Stenotic meatus	Hemolytic Staph. albus in bladder urine	Colliculus seminalis hypertrophic, inflamed; deep pouting utricle; hemorrhagic cystitis	None	Complete relief; sulfadiazine therapy
3	7 yr.	Masturbation; dribbling of urine for 6 yr.	Negative	Staph. albus in urine	Hypertrophied, edematous colliculus seminalis; inflamed posterior urethral wall	Fulguration of colliculus seminalis	Complete relief
4	6 yr.	Dysuria; oliguria; recurrent chills and fever (2 yr.)	Stenotic meatus	E. coli cultured from both kidneys; hydronephrosis; extrarenal pelves	Severe hypertrophy of colliculus seminalis	Meatotomy; fulguration of colliculus seminalis	Complete relief
5	10 yr.	Frequency (3 to 4 times hourly); dysuria; aching in flank and lower part of abdomen	Hypospadias; suprapubic tenderness	Serial urinary cultures negative	Edematous colliculus seminalis obstructing urethra; enlarged prostatic lobes bilaterally	Fulguration of colliculus seminalis; excision lateral lobes of prostate	Complete relief
6	2 yr.	Enuresis; frequency (6 to 7 times) hourly); dysuria for 1 wk.	Negative	Negative	Colliculus seminalis 4 times normal size	Fulguration of colliculus seminalis	Complete relief
7	3 yr.	Dysuria; oliguria and grunting on urination (1 yr.); voided at intervals of 16 to 18 hr.	Suprapubic tenderness; distended bladder; right cryptorchism	Voided 3 times a day in hospital	Huge colliculus seminalis filling posterior portion of urethra	Fulguration of colliculus seminalis	Complete relief
8	13 yr.	Stranguria; low back pain; terminal dribbling urine (1 yr.)	Child noted to strain on urination	Staph. albus in urine of both kidneys	Huge, inflamed colliculus seminalis obstructing mildly inflamed posterior part of urethra	Fulguration of colliculus seminalis	Complete relief
9	9 yr.	Constant dribbling urine (1 mo.)	Stenotic meatus	Negative	Hypertrophy of colliculus seminalis	Cystoscopy only	Unimproved; complete relief following fulguration of colliculus seminalis
10	3 yr.	Dribbling urine (2 mo.); blood dripping from penis after voiding (4 days)	Drop of blood at meatus after urination	Negative	Hemorrhagic cyst of colliculus seminalis ¼ its size arising from vertex	Fulguration of cyst and colliculus seminalis	Complete relief
11	2 yr.	Constant dribbling of urine since birth; frequency (5 mo.)	Stenotic meatus	Negative	Multiple polyposis and hypertrophy of colliculus seminalis	Meatotomy; fulguration of colliculus seminalis	Complete relief
12	4 yr.	Straining on urination; abdominal pain (3 mo.)	Stenotic meatus	Negative	Hypertrophied colliculus seminalis obstructing posterior part of urethra	Fulguration of colliculus seminalis	Complete relief
13	2 yr.	Stranguria; pain in lower part of abdomen (3 mo.)	Suprapubic tenderness	Negative	Hypertrophy of colliculus seminalis with papilloma protruding from its base	No fulguration	Not relieved
14	12 yr.	Stranguria; dysuria; nocturia (3 mo.); discomfort in lower part of abdomen relieved on voiding	Suprapubic tenderness and fulness	Hemolytic Staph. albus in urine	Colliculus seminalis 5 times normal size; polyp on its vertex	Fulguration of polyp and colliculus seminalis	Complete relief
15	13 yr.	Stranguria; dysuria (3 mo.); enuresis and nocturia (5 yr.)	Negative	Negative	Huge colliculus seminalis with 3 granular erythematous polyps on its vertex	Cauterization with 5% silver nitrate solution	Relief of symptoms for 6 days
		Readmitted with recurrence of enuresis	Negative	Negative	Colliculus seminalis hypertrophied and inflamed	Light fulguration of colliculus seminalis	Relief for 2 mo.
		Readmitted: enuresis and masturbation	Negative	Negative	2 small cysts on right wall of colliculus seminalis	Fulguration of cysts	Complete relief
16	12 yr.	Intermittent dribbling of urine (5 yr.)	Redundant prepuce	Negative	Severe hypertrophy of colliculus seminalis	Fulguration of colliculus seminalis; circumcision	Complete relief
17	8 mo.	"Grunts" on voiding; frequency since birth	Negative	Negative	Hypertrophy of colliculus seminalis; contracture of vesicle neck	Fulguration of colliculus seminalis and bladder neck	Complete relief
18	7½ yr.	Intermittent terminal hematuria (5 mo.)	Negative	Negative	Varices of posterior vesicle neck; colliculus seminalis 3 times normal size, edematous, covered with small cysts	Fulguration of varices and cystic colliculus seminalis	Complete relief

CONCLUSIONS

1. Benign hypertrophy of the colliculus seminalis is recognized as a urologic entity affecting infants and children.

2. Its causation in childhood cannot be based on sexual aberration or specific prostatic infection.

3. Associated inflammation or cystic new growths of the colliculus seminalis are common.

4. Symptoms include incontinence of urine, enuresis, stranguria, tenesmus, masturbation and referred discomfort in the bladder, flank or genital region.

5. Diagnosis is made by ureterocystoscopy.

6. Treatment is specific: fulguration of the hypertrophic organ.

7. Prognosis is excellent.

125 De Soto Street (13).

COMPARISON OF THE STABILITY OF REDUCED ASCORBIC ACID IN RAW AND PASTEURIZED MILK

ARTHUR D. HOLMES, Ph.D.
AMHERST, MASS.

MILK is frequently referred to as the most perfect natural food, and it is largely relied on for nourishing young mammals, particularly the human infant. Unfortunately, milk is not a complete food and when it constitutes the principal or practically the sole food used, as in the feeding of infants, it is necessary to reenforce it with a number of supplements. Among these is ascorbic acid, which is frequently supplied by the routine feeding of orange juice. Commercial cow's milk, which is ordinarily used as a basis for modified milk formulas for infant feeding, contains only a small portion of its original reduced ascorbic acid. The pasteurization process, especially the holding method (143 F. for thirty minutes), causes a significant loss, and there is a large loss of reduced ascorbic acid from milk during distribution to the ultimate consumer, particularly when the milk is allowed to remain for a long period after delivery on the customer's doorstep in commerical glass bottles exposed to the action of sunlight.

In a study of the effect of sunshine on the reduced ascorbic acid and riboflavin present in milk, Holmes and Jones [1] reported that when milk was exposed in commercial flint glass bottles for only thirty minutes on a cloudy morning all its reduced ascorbic acid was destroyed. Even when cow's milk was pasteurized, promptly cooled and at once placed in a darkened refrigerator at 10 C. (50 F.), reduced ascorbic acid was lost at a comparatively rapid rate. Holmes [2] reported that recently pasteurized milk stored in a home-sized electric refrigerator in darkness at 10 C. for ninety-six hours lost 10.9 mg. (14.7 to 3.8 mg.) of riboflavin per liter, or 74 per cent. During a study of the possible effect of fortification of pasteurized milk with riboflavin on the rate of loss of reduced ascorbic acid, Holmes [3] noted a 77 per cent loss of reduced ascorbic acid during ninety-six hours' storage of untreated pasteurized milk under conditions identical with those noted previously.

From the Massachusetts Agricultural Experiment Station.

1. Holmes, A. D., and Jones, C. P.: Effect of Sunshine upon the Ascorbic Acid and Riboflavin Content of Milk, J. Nutrition **29**:201, 1945.

2. Holmes, A. D.: Loss of Reduced Ascorbic Acid from Lactose-Enriched Milk, J. Dairy Sc. **32**:556, 1949.

3. Holmes, A. D.: Rate of Destruction of Reduced Ascorbic Acid in Riboflavin-Fortified Milk, to be published.

These various observations raised a question whether the heat treatment applied to milk during pasteurization merely destroyed a portion of the reduced ascorbic acid present in the raw milk or whether, in addition, the heat treatment may have altered the reduced ascorbic acid or the combination in which it occurs in raw milk so that the stability of reduced ascorbic acid in pasteurized milk is different from that in the raw milk from which the pasteurized milk was produced. This study was undertaken to accumulate data in this regard.

EXPERIMENTAL PROCEDURE

The milk used in this investigation was produced by the university's herd of purebred Ayrshire, Guernsey, Holstein, Jersey and Shorthorn cows. Since the pooled milk was obtained from cows of five breeds of different ages and in various stages of pregnancy and lactation, it was assumed to be typical of commercial milk. The milk from the evening and morning milkings was combined and thoroughly mixed in a 200 gallon, covered, stainless steel, spray type vat. A sample of the raw milk was taken for assay, and then the milk was pasteurized by the holding method, with light excluded, at 143 F. for thirty minutes. The milk flowed from the pasteurizing vat to a pump that forced it through a pipeline to the bottling machine and into milk bottles. The pump was made of brass and the rest of the equipment was made of white metal. After pasteurization, the milk was promptly cooled to 40 F. A sample of the pasteurized milk and a sample of the raw milk taken immediately preceding pasteurization were removed promptly to the laboratory. Aliquots from each were taken for assays of reduced ascorbic acid. The determinations were made each day, from Monday to Friday inclusive, a period during which milk may be stored in the home. The assays were made for twenty weeks, from November to March inclusive. During the period from Monday to Friday the samples of raw and pasteurized milk were stored in an electric refrigerator in darkness at 10 C. The amount of reduced ascorbic acid in the samples at the various stages of storage was determined by the method of Sharp,[4] except that 25 cc. instead of 10 cc. of milk was used and the milk proteins were precipitated with a mixture of 8 per cent acetic and 3 per cent metaphosphoric acids instead of with sulfuric acid.

RESULTS AND COMMENT

The 20 samples of freshly prepared pasteurized milk contained an average of 15 mg. of reduced ascorbic acid per liter; whereas the 20 samples of raw milk taken just previous to pasteurization contained 17 mg. of reduced ascorbic acid per liter. The loss of reduced ascorbic acid from the raw milk during the four storage intervals was 21, 12, 19 and 12 per cent, respectively, or a total loss of approximately 64 per cent. Comparable values for the pasteurized milk were 31, 23, 14 and 9 per cent, respectively, or a total loss of about 77 per cent. Thus, the total loss of reduced ascorbic acid was greater for the pasteurized milk than for the raw milk. The largest per day loss of reduced ascorbic

4. Sharp, P. F.: Rapid Method for the Quantitative Determination of Reduced Ascorbic Acid in Milk, J. Dairy Sc. **21**:85, 1938.

acid was that during the first twenty-four hours of storage. Subsequently, the rate of loss was less, but it was not uniform from day to day for either the raw or the pasteurized milk and the rate of loss of reduced ascorbic acid from the pasteurized milk was larger than from the raw milk.

Since the milk contained 17 mg. of reduced ascorbic acid per liter immediately before pasteurization and 15 mg. per liter directly after pasteurization, the pasteurization process apparently caused a loss of more than 12 per cent. This destruction of reduced ascorbic acid is significantly less than the 18.3 per cent found by Holmes, Jones, Wertz and Kuzmeski [5] or the 18.7 per cent reported by Holmes, Tripp, Woelffer and Satterfield [6] for the loss of reduced ascorbic acid during pasteurization of milk in stainless steel vats at 143 F. for thirty minutes; it is decidedly less than the 20 per cent loss that Mawson and Kon,[7] Elvehjem [8] and Woessner, Weckel and Schuette [9] observed. On the other hand, Josephson and Doan [10] stated that during storage milk previously heated above 170 F. did not lose reduced ascorbic acid as rapidly as raw milk. From his studies, Failla [11] concluded that the peroxidase in milk was destroyed during the pasteurization process, and as a consequence pasteurized milk lost reduced ascorbic acid during storage less rapidly than raw milk. Pratt [12] was convinced that carbon dioxide had a preservative action on the reduced ascorbic acid in milk. He stated that milk pasteurized in an atmosphere of carbon dioxide was a more potent source of vitamin C than milk pasteurized in the presence of air and that such pasteurized milk was the equal of raw milk as a

5. Holmes, A. D.; Jones, C. P.; Wertz, A. W., and Kuzmeski, J. W.: The Ratio of Ascorbic Acid, Riboflavin and Thiamine in Raw and Pasteurized Milk, J. Nutrition **26**:337, 1943.

6. Holmes, A. D.; Tripp, F.; Woelffer, E. A., and Satterfield, G. H.: A Study of Breed and Seasonal Variations in the Ascorbic Acid Content of Certified Milk from Guernseys and Holsteins, J. Nutrition **17**:187, 1939.

7. Mawson, E. H., and Kon, S. K.: Vitamin C Content of Milk as Consumed, Lancet **2**:14, 1945.

8. Elvehjem, C. A.: Pasteurized Milk, Milk Plant Monthly **7**:26, 1941.

9. Woessner, W. W.; Weckel, K. G., and Schuette, H. A.: The Effect of Commercial Practices on Ascorbic Acid and Dehydroascorbic Acid in Milk, J. Dairy Sc. **23**:1131, 1940.

10. Josephson, D. V., and Doan, F. G.: Cooked Flavor in Milk: Its Source and Significance, Milk Dealer **29**:35 and 54, 1939.

11. Failla, G.: The Influence of Processing Methods and Temperature of Storage on the Vitamin C Content of Milk Destined for Human Consumption, Lait **19**:455, 1939; Chem. Abstr. **33**:7405, 1939.

12. Pratt, A. D.: Prevention of Destruction of Vitamin C During Pasteurization by Carbon Dioxide, Proc. Virginia Acad. Sc. **64**, 1938; Chem. Abstr. **34**: 4819, 1940.

source of vitamin C. Gould,[13] Sharp, Guthrie and Hand[14] and others concluded that oxygen dissolved in milk causes the destruction of reduced ascorbic acid during the pasteurization process and that deaerated milk pasteurized by the usual holding process loses little or no reduced ascorbic acid. The data accumulated in this study do not check the validity of these opinions, since the milk was not deaerated or treated with carbon dioxide but was pasteurized in the usual manner in the presence of air. The 20 lots of milk lost an average of 12 per cent of the reduced ascorbic acid during pasteurization. The raw milk lost 64 per cent of its reduced ascorbic acid during the storage period and the pasteurized milk lost 77 per cent. Judged by the data assembled here, the pasteurization process caused the destruction of a variable portion of the reduced ascorbic acid present in the milk and so affected the remaining reduced ascorbic acid that it disappeared from the milk during subsequent storage at a more rapid rate than from comparable unpasteurized milk.

SUMMARY

Pooled herd milk was pasteurized by the holding method. Samples of raw milk taken immediately before pasteurization and samples of the pasteurized milk were assayed on five succeeding days for reduced ascorbic acid. Average values obtained from two series of 20 samples show that the pasteurization process destroyed a portion of the reduced ascorbic acid in the milk and caused, during subsequent cold storage, slightly more destruction of reduced ascorbic acid in the pasteurized milk than occurred in the unpasteurized milk.

University of Massachusetts.

13. Gould, I. A.: Vitamin C (in Milk): Practical Considerations, Milk Dealer (no. 6) **30**:108, 1941; Chem. Abstr. **35**:5580, 1941.

14. Sharp, P. F.; Guthrie, E. S., and Hand, D. B.: Deaeration as a Means of Retarding Oxidized Flavors and Preserving the Vitamin C of Milk, Fourteenth Annual Report, New York State Association of Dairy and Milk Inspectors, 1940, pp. 63-76.

GELATINOUS EDEMA

A Pathognomonic Sign in Mumps

GEORGE HELLER, M.D.
ENGLEWOOD, N. J.

THE COMMONER infectious diseases of childhood are readily diagnosed, but few pediatricians have not been embarrassed at times. Except during epidemics, prespasmodic whooping cough is rarely suspected until the disease has been well distributed through home and school; mild scarlatinal rashes are easily confused with other erythemas, and children are often reported as having secondary attacks of measles, though the pediatrician would be rather certain that the earlier disease represented a postfebrile eruption.

Mumps, in its classical form, is easily recognized, but when involvement of submaxillary or submental glands is not accompanied with parotid swelling, the condition is often confused with the adenitis following or accompanying apical abscess, throat infection or the early manifestation of infectious mononucleosis. As noted by Hempelmann:[1]

> Mumps which is limited to the submaxillary or sublingual glands at times can only be diagnosed with certainty by the history of exposure, the further extension of the process to the parotids, or by typical complications, such as orchitis.

Because this is the generally expressed feeling of the authors of all texts that I have been able to find, and because of the need for a simple method of determining, at an early stage, the presence of this disease, the following observation may be worth recording:

In the majority of cases of mumps, especially those involving the submaxillary and sublingual salivary glands, the tissue overlying the area of adenitis is moderately edematous. This edema can be differentiated from the swelling accompanying pyogenic infection by a simple test:

If the margin of the edematous area is gently tweaked the area quivers like jelly.

When this gelatinous type of swelling is present, mumps may be diagnosed without hesitation.

During the early months of 1948, an epidemic of mumps in my community permitted examination of a fair number of patients in order

1. Hempelmann, in Brennemann, J.: Practice of Pediatrics, Hagerstown, Md., W. F. Prior Company, Inc., 1937, vol. 2, chap. 13.

TABLE 1.—*Distribution of Involvement of Glands and Presence of Gelatinous Edema in Sixty-Three Consecutive Cases of Mumps*

Case No.	Age, Yr.	Sex	Site of Swelling		Gelatinous Edema
			Parotid Gland	Submaxillary Gland	
1	7	F	Left	.....	0
2	5	F	Right	.....	0
3	9	M	Left	Left	++
4	8	M	Right	.....	0
5	6	M	Bilateral	.....	+
6	6	F	Left	.....	++
7	9	M	Right	.....	0
8	8	M	Left	.....	+
9	9	F	Right	.....	+
10	5	M	Right	.....	0
11	6	M	.....	Left	+
12	6	F	Bilateral	.....	0
13	7	F	Left	.....	+
14	7	M	Left	.....	0
15	5	F	Bilateral	.....	0
16	8	M	Bilateral	.....	+
17	7	F	Left	.....	+
18	4	F	Bilateral	.....	+
19	6	F	Right	.....	+
20	6	F	Bilateral	.....	+
21	6	M	Left	.....	0
22	9	F	Bilateral	.....	0
23	5	M	Left	.....	+
24	7	F	Right	.....	+
25	7	F	Right	.....	+
26	(Case 25, 6 wk. later)		.....	Right	+
27	9	M	Right	.....	0
28	6	F	Left	.....	0
29	5	F	Bilateral	.....	+
30	5	F	Right	.....	+
31	7	F	Bilateral	.....	+
32	5	M	Right	.....	0
33	4	F	Bilateral	.....	++
34	8	F	Right	.....	0
35	4	F	Right	.....	+
36	6	M	Bilateral	Bilateral	++
37	2	F	Right	.....	+
38	7	F	Bilateral	.....	+
39	6	M	Right	.....	0
40	4	M	Bilateral	.....	+
41	7	M	Bilateral	.....	+
42	5	M	Bilateral	.....	+
43	5	M	Bilateral	Bilateral	++
44	5	F	Bilateral	.....	++
45	4	F	.....	Bilateral	++
46	6	M	Bilateral	.....	0
47	8	F	Bilateral	Left	++
48	10	F	Bilateral	.....	++
49	7	M	Bilateral	.....	0
50	7	M	Bilateral	.....	0
51	8	F	Left	.....	0
52	7	M	Bilateral	.....	0
53	3	F	Bilateral	.....	0
54	8	F	Right	.....	+
55	6	M	Left	.....	++
56	9	F	Right	.....	+
57	6	F	Bilateral	.....	0
58	8	M	Right	.....	+
59	7	M	Right	.....	0
60	8	M	.....	Bilateral	++
61	8	M	Right	.....	+
62	7	M	Bilateral	.....	+
63	4	M	Bilateral	.....	0

to evaluate the frequency of this type of edema. The results of these observations are presented in tables 1 and 2. Most of the children were seen on the first or second day of swelling.

No attempt has been made to control my findings by classifying cases of adenitis of known pyogenic origin, because no instance of gelatinous edema was ever observed except in mumps.

TABLE 2.—*Statistical Tabulation of Sixty-Three Consecutive Cases of Mumps*

Boys—30 Girls—32 *	No. of Cases	Percentage
Involvement of parotid gland only (in 24 cases bilateral, when seen).....	55	87.3
Involvement of submaxillary gland only (in 2 cases bilateral, when seen)	4	6.4
Involvement of parotid and submaxillary glands.....	4	6.4
Gelatinous edema:		
Present with single parotid involvement.....	15	48.0
Present with double parotid involvement.....	14	58.0
Present with submaxillary involvement.....	8	100.0

* One child (case 25) had a recurrent attack after six weeks.

A similar type of edema, not caused by mumps, may infrequently be found in other soft tissues of the body. I have seen it about the penis and eyelids following insect bites, and on one occasion about the eyes in a patient with poison ivy dermatitis. Infections that might be confused with mumps, however, have not shown this type of edema.

CONCLUSION

When gelatinous edema is found peripheral to enlargement of the parotid or submaxillary glands, mumps may be considered to be the cause of the adenitis.

460 Engle Street.

Case Reports

DRAINAGE OF PULMONARY VEINS INTO CORONARY SINUS

A. VASS, M.D.
AND
J. KELLER MACK, M.D.
SPRINGFIELD, ILL.

ANOMALOUS drainage of all the pulmonary veins into the right side of the heart is rare. Thirty-eight cases were collected from the literature by Brody,[1] and of these, 7 showed entry of all pulmonary veins into the coronary sinus. The other sites of entry were: the superior vena cava, the right atrium itself, the portal veins and the inferior vena cava. It is interesting to note that in none of the cases was drainage into the coronary sinus accompanied with other major cardiac anomalies, whereas major anomalies were frequently associated with the other sites of entry. It is obvious that when both pulmonary and systemic veins drain into the right atrium abnormal communications between the right and left sides of the heart must be present in order that the condition be compatible with life. In spite of these communications, the load on the right side of the heart is usually so great as to cause early death. Of the cases described, death occurred in 1 at 2 years of age and in all the others by the age of 6 months.

When this anomaly is present, the right side of the heart is called on to transport a greatly increased volume of blood and the left side a much diminished volume, as manifested in all the 7 reported cases by hypertrophy of the right and relative atrophy of the left side. In all cases the foramen ovale was open, though in 4 cases it was reported to be only a slit. In but 1 case was there a patent ductus arteriosus. From a mechanical standpoint it would seem that both foramen and ductus should have remained open after birth to permit a greater shunt of blood to the systemic circulation. The fact that in most cases the ductus was closed lends evidence to the theories of Patten,[2] who expressed the belief that obliteration of the ductus is a progressive process similar to endarteritis obliterans and not due to the fact that normal mechanics do not require a patent ductus after birth.

From the Departments of Pathology and Pediatrics, Memorial Hospital of Springfield.

1. Brody, H.: Drainage of Pulmonary Veins into the Right Side of the Heart, Arch. Path. **33**:221 (Feb.) 1942.

2. Patten, E. M., in Curtis, A. H.: Obstetrics and Gynecology, Philadelphia, W. B. Saunders Company, 1933, vol. 1, p. 906.

As the foramen ovale and ductus arteriosus become smaller, the load on the right side of the heart increases, the circulation becomes more unbalanced and decompensation ensues.

Because of the rarity of this anomaly, the following case is reported.

REPORT OF A CASE

History.—A white female child, C. E., was born normally on Aug. 17, 1946 and was said to be normal as a newborn infant. She was first seen by one of us (J. K. M.) at the age of 6 weeks, at which time her color was slightly dusky but not really cyanotic. There was a loud precordial systolic murmur transmitted to the right side of the chest and faintly to the back; no thrill was felt. The heart beat was rapid and overactive.

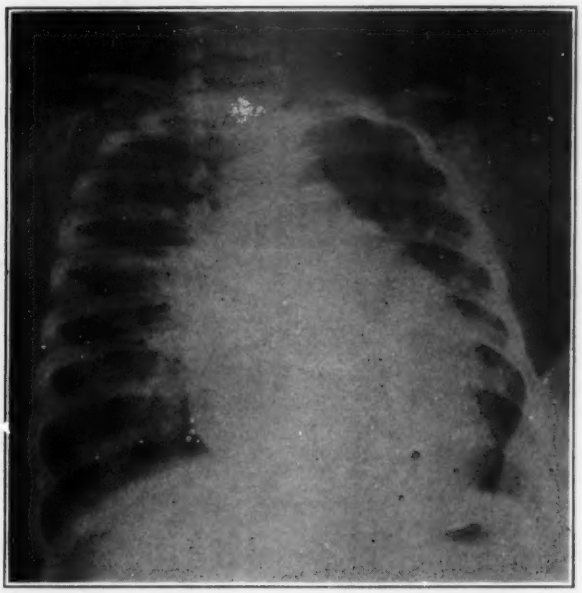


Fig. 1.—Roentgenogram of chest at the age of 10 months.

She was next seen at the age of 10 months, at which time her nutrition was good and development normal. Her weight was 19 pounds 4 ounces (8,732 Gm.) and her height, 20 inches (51 cm.). At this time respirations were moderately rapid, with retraction of the lower ribs on inspiration. There was slight cyanosis when she cried. Physical findings were unchanged except that a thrill was present, most pronounced in about the third intercostal space, to the left of the sternum. Roentgenologic examination showed the heart to be large and globular (fig. 1). During this summer she had severe heat rash, which at times caused small furuncles.

At the age of 11 months bronchitis with cyanosis developed. This disappeared after treatment with sulfonamide compounds. At the age of 14 months she had another attack of bronchitis. The heart action became rapid and forceful. Her cyanosis was more noticeable when she was crying. Her respirations were rapid and she was dyspneic, even when asleep. Digitalization caused some temporary improvement. Examination of the blood showed 5,300,000 red blood cells, 10,000 white blood cells and 12.6 Gm. of hemoglobin. She had become extremely shy,

the mother being the only person who could care for her. Loud, continuous crying with cyanosis caused roentgenologic examinations to be of little value. Permission to hospitalize the infant for study was refused. At the age of 17 months the patient's weight was 24 pounds (10.9 Kg.). The heart was greatly and symmetrically enlarged. The apex beat was forceful and the rhythm regular. A loud systolic murmur was transmitted throughout the chest. There was a fairly strong diffuse thrill some distance to the left of the sternum in about the third intercostal space. Peripheral pulsation was normal, and there was no clubbing of the fingers or deformity of the chest.

She was given prophylactic sulfonamide treatment and during the winter did well, with no more bronchitis, until the first part of March 1948, when another

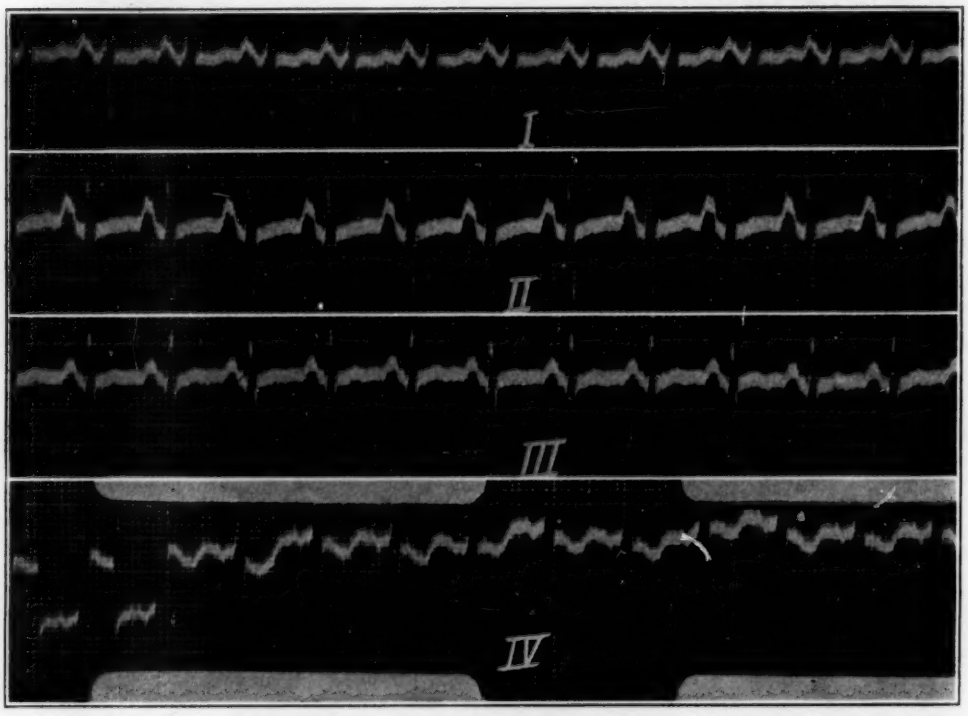


Fig. 2.—Electrocardiogram made at the age of 19 months. Note right axis deviation.

slight cough without fever developed. At this time the cyanosis was constant. There was moderate edema of the face, hands and ankles, and the liver was enlarged. She was again digitalized without much improvement, except for a slowing of the heart rate. The edema improved intermittently, but her condition remained poor.

On March 14, 1948, at the age of 19 months, she was admitted to the hospital because of edema, cough and cyanosis. Numerous rales appeared in the lungs. The electrocardiogram showed right axis deviation; the record suggested hypertrophy of the right side of the heart (fig. 2). In spite of administration of oxygen and chemotherapy, the course was rapidly downhill. There was extreme tachycardia. The heart was enlarged. No new cardiac findings were noted. During the last week of her life there was irregular fever. She died March 21.

Observations at Autopsy.—The autopsy was performed by one of us (A. V.) on March 21 and resulted essentially in the following observations:

The body was that of a well developed, moderately well nourished white girl 19 months of age and measured 83 cm. in length. The lips and face were cyanotic and the fingers clubbed, cyanotic and, together with the lower extremities, slightly edematous. There were no external developmental abnormalities.

The principal pathologic changes involved the heart, which with the pericardium occupied the greater part of the chest cavity. The pericardial sac contained 90 cc. of cloudy yellowish fluid with flakes of fibrin. The heart measured 11 cm. in length, 8.5 cm. across the waist and 7.5 cm. at the same level in sagittal direction.

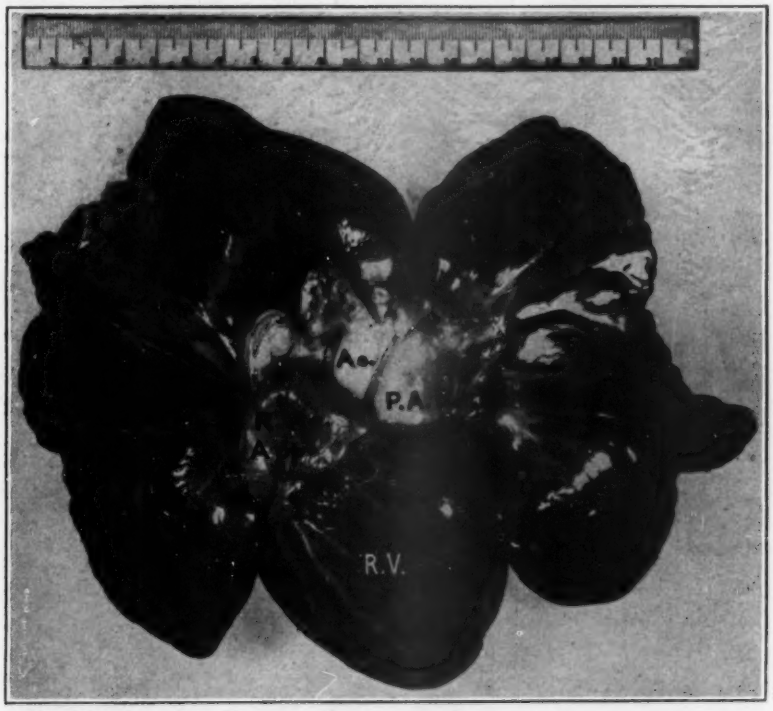


Fig. 3.—Heart in situ. *Ao.* indicates aorta; *P.A.*, pulmonary artery; *R.Au. App.*, right auricular appendage, and *R.V.*, right ventricle.

It weighed 140 Gm. The epicardium was injected and, especially adjoining the waist, covered with a layer of soft, reddish gray fibrin (fig. 3).

Most of the heart (approximately three fourths of the organ) was occupied by the right ventricle and auricle, both of which were distended with partly clotted and partly liquid blood. The right auricle measured about 7 cm. in diameter and its wall 1 to 2 mm. in thickness. It was entered posteriorly by the venae cavae, each measuring about 12 mm. in diameter, which were at the usual site. Situated approximately 6 mm. to the right of the auricular septum there was a more or less oval opening possessing smooth margins and measuring about 1.5 cm. in diameter. This led into a pouch (the coronary sinus) projecting posteriorly and measuring about 2.5 cm. in diameter, situated below and slightly to the right of the foramen ovale, from which it was demarcated by a transverse ridge measuring about 6 mm. in height. This was entered by two pulmonary

veins, each measuring approximately 1 cm. in diameter. The right auricle communicated with the left auricle only through an oblique, patent foramen ovale measuring 15 mm. in length and from 4 to 6 mm. in width. The wall of the right ventricle measured about 9 mm. in thickness. The tricuspid valve possessed only two large cusps, one posterior and one anterior. There were verrucous vegetations measuring up to 1 mm. in diameter on the cusps. The interventricular septum

Fig. 4.—Close-up view of part of right atrium and ventricle. *R.Au.* indicates right auricle; *F.O.*, foramen ovale; *Cor. Sin.*, coronary sinus; *Tri.*, tricuspid valve, and *R.V.*, right ventricle.

was complete. The pulmonary artery and its cusps were not remarkable. The pulmonary orifice measured about 4 cm. in circumference. The aorta measured 2.2 cm. in circumference. Its cusps were present in normal numbers and were of normal shape. The aorta was not remarkable. The left auricle was relatively small, measuring about 2.5 cm. in diameter. The mitral cusps were of normal configuration but also showed minute verrucous vegetations. The wall of the left

ventricle measured about 1 cm. in thickness. There were no pulmonary veins opening into the left auricle. The ductus Botalli was closed (fig. 4).

The following pathologic changes were observed in the other organs: generalized passive hyperemia of the internal organs, slight fatty infiltration of the intima of the pulmonary artery and moderate brown induration of the lungs. Microscopically, scattered small foci of acute necrosis were seen in the liver.

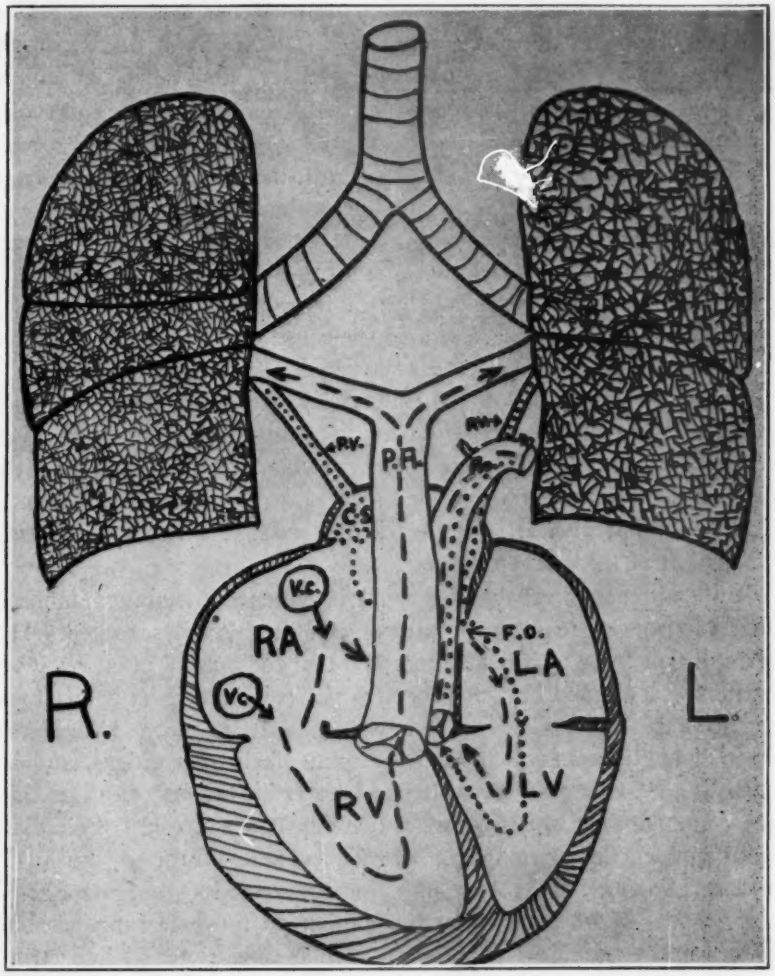


Fig. 5.—Scheme of circulation. The dotted line indicates the path of arterial blood and the broken line the path of venous blood. *P.V.* indicates pulmonary vein; *P.A.*, pulmonary artery; *Ao*, aorta; *C.S.*, coronary sinus; *R.A.*, right atrium; *R.V.*, right ventricle; *L.A.*, left atrium; *L.V.*, left ventricle; *F.O.*, foramen ovale, and *V.C.*, the entrance of the venae cavae into the right atrium.

The principal anatomic diagnoses were: (1) drainage of the pulmonary veins into the right atrium (coronary sinus), with a patent foramen ovale constituting the only connection between systemic and pulmonary circulations; (2) a bicuspid tricuspid valve; (3) hypertrophy and dilatation of the right side of the heart; (4) chronic passive hyperemia of the lungs and other organs, and (5) terminal verrucous endocarditis of the tricuspid and mitral valves.

COMMENT

An attempt to picture the circulation of the blood in this case is made in figure 5. As shown there in a schematic manner, the patent foramen ovale permitted the escape of some at least partially oxygenated blood, which had come into the right auricle from the lungs, into the left auricle and thence into the systemic circulation, at least as long as the hypertrophic right side of the heart did not become decompensated. This apparently explains the patient's relatively long period of survival.

There is, at present, no adequate explanation of the embryologic mechanism of this malformation. Spitzer [3] somewhat obscurely assumed that drainage of the pulmonary veins into the right auricle is caused by faulty subdivision of the originally common left atrial space, due to the disappearance (unexplained) of the embryonal septum II, atrophy of septum I and the formation of a substitute definitive atrial septum by the hypertrophic left embryonal crista terminalis and the remnants of septum I. Hueck [4] simply assumed the cause of this malformation to be the persistence of some of the embryonal anastomoses (which in the fetus are the precursors of the pulmonary veins) on the right side of the heart. Sanes's [5] attempt at explanation was similar. Brody mentioned two possibilities. One of these is the possible lack of formation in these cases of the "pulmonary folds," which normally shifts the pulmonary veins to the left auricle. Another is the possible formation of septum I to the left of the pulmonary vein.

In the absence of reliable embryologic evidence it is almost impossible either to agree or to disagree with any of the hypotheses cited. However, it seems to be universally accepted that the normal pulmonary veins are the preserved and fully developed portions of an originally anastomosing network of capillary blood vessels. It is not so universally accepted, but it appears to us to be quite likely that ridges, and later septums, are formed in the embryonal heart by the endocardium, along lines corresponding to the planes which demarcate streams of circulating blood entering or leaving the cardiac cavities through the various ostiums, each having its own direction and speed (see Spitzer [3]). In other words, hydrodynamic factors similar to those causing pathologic changes in the fully developed heart, such as dilatation and hypertrophy, could be assumed to inhibit the formation of septums in their normal locations and permit the formation of substitute (false) septums elsewhere. In our case, the application of this hypothesis would result in the following attempt at explanation of the sequence of events:

---

3. Spitzer, A.: Ueber den Bauplan des normalen und missbildeten Herzens, Virchows Arch. f. path. Anat. **261**:243, 1923.

4. Hueck, W.: Morphologische Pathologie, Leipzig, Georg Thieme, 1937, p. 510.

5. Sanes, S.: Anomalous Drainage of Pulmonary Veins into Coronary Sinus, Am. J. Dis. Child. **58**:354 (Aug.) 1939.

For some reasons, presumed by us to be obstruction of the left portion of the original anastomoses, later constituting the pulmonary veins, those on the right were preserved and developed. This resulted in the relative enlargement of the right auricle, the complete atrophy of septum II and the formation of a substitute septum from the remnants of septum I and the left crista supraventricularis, in a manner assumed by Spitzer. The location of the pulmonary veins in the coronary sinus could then also be assumed to be the consequence of the dilatation and growth of one right auricular wall and the concurrent shift toward the right of the pulmonary veins. The presence and functional utilization of a patent (probably false) foramen ovale are only a fortunate coincidence in this case.

Anomalous drainage of pulmonary veins into the coronary sinus has been only a postmortem diagnosis up to the present, but with today's more exact methods of cardiac study it should be possible to make a clinical diagnosis. Although the patient reported on here lived relatively long, a complete study of the heart was impossible because the parents would not permit it.

We have been unable to find in the literature a case diagnosed during life which was proved at autopsy. However, Johnson and McRae [6] made a tentative diagnosis of this malformation (in their opinion it was partial drainage) in an 8 year old boy by angiocardiography and cardiac catheterization.

Taussig [7] reported a case in which a diagnosis of pulmonary drainage into the right side of the heart was considered but rejected. Taussig's criteria for diagnosis are:

1. Cyanosis is absent except during periods of stress and terminally.
2. Fluoroscopy and roentgenograms show great enlargement of the heart to the right and to the left, mainly of the right ventricle, and fulness of the pulmonary conus.
3. Right axis deviation is indicated in the electrocardiogram.
4. Oxygen saturation of arterial blood is reduced and approximates that of blood obtained by catheterization of the right atrium.

SUMMARY

A case of complete drainage of the pulmonary veins into the right atrium, with observations at autopsy, is reported. A possible embryonal developmental mechanism of this malformation is outlined. The possibility of clinical diagnosis of this anomaly is discussed.

Springfield Memorial Hospital.

6. Johnson, A. L., and McRae, D. L.: Combined Use of Angiocardiography and Cardiac Catheterization in the Diagnosis of Congenital Anomalies of the Cardiovascular System, Pediatrics **2**:643, 1948.

7. Taussig, H. B.: Congenital Malformations of the Heart, New York, Commonwealth Fund, 1947, pp. 298-317.

RUBELLA AS A CAUSE OF CONGENITAL MALFORMATIONS

ALFONSO G. ALARCÓN, M.D.
MÉXICO, D. F., MEXICO

The discovery of the dystrophic action of the virus of rubella is quite recent (1942).[1] In special epidemiologic conditions such as Gregg reported it is difficult to trace the future effects. In Europe also [2] at present it is impossible to relate this factor to the infinity of congenital anomalies afflicting the human species without taking into account others also multilating.

By chance, I had occasion to receive in my practice a case which verified Gregg's discovery.

REPORT OF A CASE

Mrs. L. M. was born on an isolated coffee plantation in one of the states of the Mexican Republic and lived there twenty-five years, with few trips to the city. At 25 years of age she married and took a wedding trip to the capital, where she remained several weeks. There she contracted rubella on May 27, 1944, and on Feb. 2, 1945 she gave birth to a girl who had double congenital cataract.

When I first saw the child on Feb. 14, 1947, she showed mental deficiency and lack of attention and made uncoordinated movements in her mother's arms. She had nystagmus and apparently could neither see nor hear. Her head constantly drooped to the right, while her eyeballs, because of the nystagmus, turned to the opposite side. She had rhythmic rigidity of the nape and back and produced strident monotone cries like a savage.

An oculist (Dr. Alfonso Guerrero y Sagredo) reported that he had observed in this child at 1 year of age, for the first time, "congenital cataract of the soft type in both eyes." Since the cataracts were growing, he proposed that the parents let them mature. A year later (January 1947) he operated, confirming the clinical diagnosis of the soft type with no nucleus, which is frequently the case in congenital cataract. "Actually," the oculist reported, "the fundi of the eyes are normal in every respect: papilla, macula, veins and arteries. With respect to visual acuity, one cannot judge because of the child's age, but certainly it should be almost normal when adequate glasses are used later."

This paper was translated by Georgianna Simmons Gittinger.

1. Gregg, N. M.: Congenital Cataract Following German Measles in the Mother, Tr. Ophth. Soc. Australia (1941) **3**:35-46, 1942.

2. However, the first 6 European cases were classified in Switzerland (Franceschetti, A.; Bamatter, F., and Bourquin, J. B.: Embryopathie rubéoleuse [malformations congénitales multiples après rubéole de la mère au début de la grossesse], Helvet. acta pædiat. **2**:339-350 [Aug.] 1947). In these cases the antecedent of maternal rubella in the first trimester of gestation was clear and the following deformities were encountered: cataract, microphthalmia, microcephalia, pseudo retinitis pigmentosa, blindness, presence of arterial passage, dental malformations, talipes valgus, hypospadias, ovarian cyst and pseudocyst of the epididymus.

In spite of this intervention, she had not recovered vision. Nothing caught her attention, and she continued in the attitude of indifference and intermittent restlessness and rigidity. The physical examination showed general muscular hypertonia, hyperreflexia and inability to sit or to remain in one position.

She was breast fed for the first few weeks of life and then had to be weaned because of failure of the mother's milk. She accepted artificial feeding but with slight constipation. At 2 years of age (Feb. 14, 1947) she weighed about 16.4 pounds (approximately 7,439 Gm.). She could not digest other foods and was returned to a milk diet. By March 17 she weighed about 17 pounds (approximately 7,711 Gm.). By March 31 she had gained ¼ pound (113 Gm.) and by April 14 weighed ½ pound (227 Gm.) more. During these three months the child had periodic indigestion, diarrhea and anorexia. In April, attempts with another diet had better results. The digestive irregularities were corrected and her weight increased. On May 22, it was 17.9 pounds (approximately 8,119 Gm.) and on July 5, when I last saw her, it was 17.7 pounds (approximately 8,039 Gm.). In spite of digestive irregularities and change of diet, she had gained ¾ pound (340 Gm.) in four months, averaging about ⅛ pound (57 Gm.) each month.

On May 22 when she was returned for observation, she wore glasses, and I noted that she could distinguish objects and identify them by touch. Her digestion had improved; she still could not sit up or remain sitting but could stand if held by the hand. However, her condition was precarious. At 2½ years of age she weighed 17.7 pounds; choreic movements continued, as well as nystagmus, rhythmic rigidity, strident cries, hyperreflexia and general intermittent muscular hypertonia. She seemed to begin to see and hear.

COMMENT

The important fact in this case is that the child was born with double cataract, profound mental deficiency and signs of serious motor defects of the central nervous system, all of which could possibly be derived from the lesion in the brain caused by the virus of the rubella the mother had in the first months of gestation. Since the patient was born Feb. 2, 1945, she must have been conceived about April 28, 1944. The woman was married April 25, 1944 and acquired rubella May 27 of that same year, which date was in the first month of her pregnancy.

This is exactly the conclusion of the Australian authors, who observed the epidemic of 1942 in Australia, in which 50 per cent of the mothers who had attacks of eruptive fever in the first four months of pregnancy gave birth to children with congenital defects, particularly cataracts, deaf-mutism and certain types of mental deficiency.

Although this case is the only one under my observation, there is a strong probability that the virus of rubella is injurious to the development of the human embryo.

This case is curious also in itself, and interesting, because it is difficult to evaluate in a country such as mine, where measles is endemic and every one has had it in infancy. The virus of rubella seems injurious to the embryo but

harmless to the fetus and the newborn infant. I have no information as to whether postrubella encephalitis in infancy [3] has been observed in Mexico.

Among the measures discussed in the United States,[4] England and Australia to avoid the production of congenital defects in infants caused by maternal rubella is one providing that female children be given the disease, which confers immunity, thus precluding the possibility of their giving birth to infants so seriously mutilated, deformed and mentally abnormal from this cause.

This matter is so serious that it is proposed that in cases in which the mother has rubella in the first four months of gestation the pregnancy be interrupted. At least, it is believed that this sacrifice will save the race half of the defective beings caused by prenatal maternal rubella.

Tonala Número 145.

---

3. Comby (Les encéphalites aiguës post-infectieuses de l'enfance, Paris, Masson & Cie, 1935) mentioned 30 cases of encephalitis due to rubella in French literature, an insignificant number compared with the number of cases of rubella observed annually in her country. The ages of the patients ranged from 5 to 10 years. Nervous manifestations developed at intervals varying from the first to the fifth days after the eruption appeared, that is, at sixteen to twenty days after infection. The clinical picture was similar to that in the present case. Turbulent and severe, the nervous symptoms were characterized by high temperature, general or localized convulsive phenomena, rigidity, pain, choreic movements (Gernez and Carré), incoordination of head and eyes and ocular disturbances; a biologic meningeal reaction is generally associated with these phenomena. Comby stated:

"With respect to Bénard's 13 epidemic cases, interpretation is difficult, but they appear to be forms of a simple meningeal syndrome, with signs as much clinical as biologic. They include a fatal case of a form of ascending myelitis associated with ocular paralysis in which anatomicopathologic studies were made. Of the other 9 cases, there is no doubt, because they took a form rapidly fatal in thirty-six hours (Pierret). All the rest evolved rapidly in an entirely favorable manner in spite of occasional alarming symptoms (Debré)."

This distinguished investigator commented finally:

"In view of the brief number of cases observed, the small variation in the syndrome does not surprise us. We may record the possibility of encephalitis in the course of an illness so generally benign as rubella, encephalitis the symtoms of which are severe and the result of which may be fatal.

4. Erickson, C. A.: Rubella Early in Pregnancy Causing Congenital Malformations of Eyes and Heart, J. Pediat. **25**:281-283 (Oct.) 1944.

News and Comment

SOCIETY NEWS

Long Beach (Calif.) Pediatric Society.—Since its organization in January 1949, the Long Beach Pediatric Society has included in the programs of its monthly meetings a journal club and addresses by authorities in fields of medicine related to pediatrics. Only physicians who have completed the hospital training required by the American Board of Pediatrics are eligible for election to associate membership in the society. The officers of the society are Dr. H. Milton Van Dyke, president, Dr. George C. Boucher, vice president, and Dr. William G. Zantiny, secretary-treasurer.

GENERAL NEWS

Mead Johnson Fellows.—During the academic year of 1948-1949, seven Mead Johnson fellows were appointed by the Society for Pediatric Research. They have now completed a year's postgraduate work. The seven fellows, their countries of origin and the institutions in which they have worked are as follows: Dr. Fabio do Amaral, Brazil, the Children's Orthopedic Hospital, Seattle; Dr. Hsu Han-kuang, China, the Children's Hospital, The University of Cincinnati, and the Phipps Institute of the University of Pennsylvania; Dr. Soledad Manalac-Morales, Philippines, the Pediatric Department of Bellevue Hospital at New York University, New York; Dr. M. Vera Buhrman, South Africa, the Rochester Child Health Project, the Mayo Clinic, Rochester, Minn.; Dr. Alfonso Cardenas, Colombia, the Children's Hospital and the Department of Pediatrics, the University of Louisville, Louisville, Ky.; Dr. Eugenia Rosenberg, Argentina, the Harriet Lane Home of Johns Hopkins Hospital, Baltimore, and Dr. Jamil Kheder, Iraq, the Children's Hospital, Columbus, Ohio.

Physicians Certified by the American Board of Pediatrics, Inc.—The following physicians were certified as specialists by the American Board of Pediatrics after examinations held in Cleveland, Sept. 16, 17 and 18, 1949:

Oscar William Anderson, Seattle; Warren Rouvel Anderson, Sioux Falls, S. D.; Walter M. Block, Cedar Rapids, Iowa; Dan P. Boyette, Kinston, N. C.; Raymond S. Camp, Gainesville, Fla.; Robert Fisher Chinnock, Los Angeles; David Baird Coursin, Lancaster, Pa.; Edward Carl Defoe Jr., Fresno, Calif.; S. Francis DiLorenzo, Waterbury, Conn.; Bruce Ward Everist Jr., Ruston, La.; Felix Feldman, Brooklyn; Alexander Sand Fisher, East Liverpool, Ohio; Harold M. Goldstein, New York; William Glaser, New Haven, Conn.; Clifton Dancy Govan Jr., Denver; Esther S. Gross, Salt Lake City; Robert M. Heavenrich, Saginaw, Mich.; Philip William Hedrick, Indianapolis; Robert Glynn Heskett, Spokane, Wash.; J. Richard Hill, San Diego, Calif.; Daniel Hirschl, Brooklyn; Logan Edward Jackson, Long Beach, Calif.; Bennett Joseph LaCour Jr., Monroe, La.; Daniel A. Lagozzino, Everett, Wash.; H. Bickford Lang, Erie, Pa.; James Cureton Lanier Jr., Jacksonville, Fla.; John B. Larson, Louisville, Ky.; Robert Edward Leaton, Houston, Texas; Victor Y. Lindblade, San Diego, Calif.; George H. Lowrey, Ann Arbor, Mich.; Hans Mauther, Wrentham, Mass.; John Arthur May, Portland, Ore.; Edward H. Meizlik, McKeesport, Pa.; Bernard Irvin Michaels, Pittsburgh; Henry Woodbury Moore, Columbia, S. C.; Julius

K. Neils, Bellingham, Wash.; Harriet West Nielson, China Lake, Calif.; Robert Preston Ostergard, Warren, Ohio; Theodore Constantine Panos, Galveston, Texas; Thomas Lockwood Perry Jr., Los Angeles; George Edward Prince, Gastonia, N. C.; Joseph Hawthorne Ramsey, Birmingham, Ala.; Frederick Reardon Jr., York, Pa.; Arthur L. Ruby, Brooklyn; Allen Saunders, Ann Arbor, Mich.; Thurman Shuller, McAlester, Okla.; Irwin A. Solow, Pittsburgh; Frederick A. Stine, Cincinnati; Virginia Sugg Stovall, San Antonio, Texas; Orville C. Thomas, Shreveport, La.; Demetrius G. Traggis, Ann Arbor, Mich.; Jack M. Troy, Whiting, Ind.; Frederick L. Tunick, Brooklyn; George E. Weick, Boise, Idaho, and Robert Dean Mercer, Cleveland.

Obituaries

FREDERICK F. TISDALL, M.D.

1893-1949

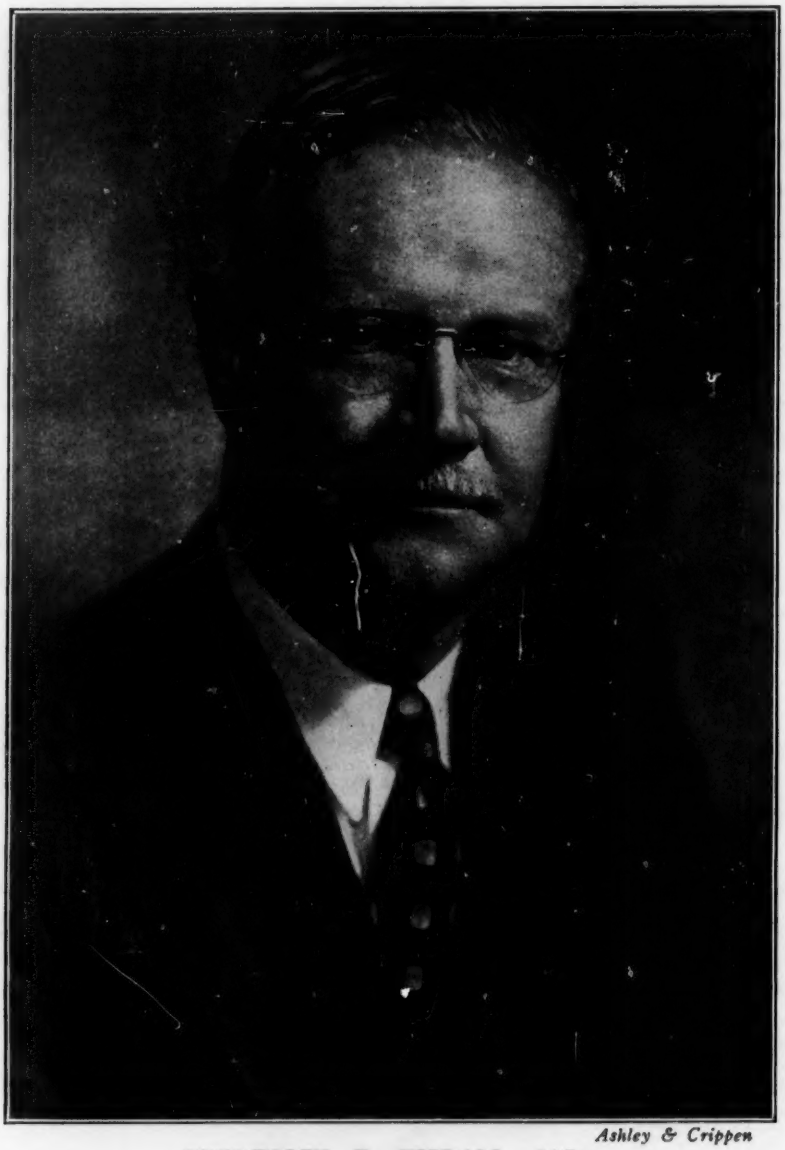
The death of Frederick F. Tisdall, O.B.E., MD., F.R.C.P.(C.), F.R.C.P.(London) is herewith recorded with great sorrow. In his death the Hospital for Sick Children, Toronto, Canada, the University of Toronto and the medical profession at large have lost an excellent teacher, organizer and demonstrator, as well as a brilliant research worker. At the time of his death, Dr. Tisdall was associate professor of pediatrics, University of Toronto, and physician to the Hospital for Sick Children, also director of research laboratories, Department of Paediatrics, Hospital for Sick Children. He was coordinator of professional services in connection with the new hospital and had attended the laying of the cornerstone the day before his death.

Fred Tisdall was born at Clinton, Ontario, Canada, on Nov. 3, 1893 and died April 23, 1949. He was educated at Clinton High School and the University of Toronto and was graduated from the University of Toronto Faculty of Medicine in 1916, after which he went overseas in the Canadian Army Medical Corps.

After the conclusion of the war he went to Johns Hopkins Hospital, Baltimore, where he did postgraduate work on nutrition and children's diseases, returning to the University of Toronto and the Hospital for Sick Children in 1921.

During World War II he was consultant on nutrition to the Royal Canadian Air Force, with the rank of Group Captain. He was a member of the Canadian Council on Nutrition; chairman of the Committee on Nutrition of the Canadian Medical Association; chairman, National Nutrition Committee, Canadian Red Cross Society; member of the Food and Nutrition Board, National Research Council, Washington, D. C., and for some years was a member of the Standing Advisory Committee on Nutrition of the Food and Agriculture Organization of the United Nations.

He was the author of the book "The Home Care of the Infant and Child" and co-author with Dr. Alan Brown of the textbook "Common Procedures in the Practice of Paediatrics." In addition to this, he published more than one hundred and twenty-five scientific articles, most of which had to do with the subject of nutrition.



Ashley & Crippen

FREDERICK F. TISDALL, M.D.
1893-1949

His high scientific attainments were coupled with endearing personal qualities which made him welcome everywhere he went and in every circle in which he mingled.

Within a relatively short period, Dr. Tisdall won an international reputation for his research in human nutrition. Almost everything he did was related to the needs of the people and the times. Some of his findings brought immediate aid to many and all his work will be of lasting benefit, not alone to Canadians, but to the whole of mankind. He helped to improve the food standards for families on relief; he originated the prisoner of war parcels sent overseas by the Canadian Red Cross Society; he raised the dietary standards of the Royal Canadian Air Force. The surveys Dr. Tisdall conducted among the Canadian Indians and the people of Newfoundland will doubtless lead to many improvements in the health of these groups.

His pride and joy was the 70 acre farm he purchased in 1937 and made his home. In his spare time he assisted the hired help in the chores about the farm, one of the oldest in York County. In addition to this hobby, he was keenly interested in golfing, fishing and shooting.

As a man he was widely loved, generous, loyal, humorous and deeply interested in people; he was the center of a large circle of friends. He was fond of the children whose interests he served for so long and gave keen personal regard to individual cases. He will be greatly missed by his colleagues, and the nation has lost much by his passing.

Dr. Tisdall was a Fellow of the Academy of Medicine, Toronto, and a member of the following organizations: Ontario Medical Association, Canadian Medical Association, Canadian Society for the Study of Diseases of Children, American Pediatric Society, American Academy of Pediatrics, Society for Pediatric Research, Pediatric Travel Club, American Institute of Nutrition, The American Public Health Association, Society for Research in Child Development, American Society for Clinical Investigation, Society for Experimental Biology and Medicine and American Society of Biological Chemists.

N. S.

Abstracts from Current Literature

Metabolism; Infant Feeding; Milk and Other Foods

THE EFFECT OF DIET ON FOETAL DEVELOPMENT. L. R. WALLACE, J. Physiol. **104**:34P, 1946.

An investigation was conducted to decide the effect of maternal diet on the various component parts of the fetus. By feeding ewes on a much restricted ration during the last eight weeks of pregnancy, 144 day old fetuses were obtained whose mean weight averaged only 57 per cent of that of fetuses obtained from liberally fed ewes. Fetuses were also obtained at the ninety-first day of pregnancy, when the experimental treatments commenced. The data resulting from the dissection of these groups of fetuses were compared with the data for fetuses from well fed ewes at twenty-eight day intervals from service.

The results showed that under conditions of restricted nutrition nerve tissue competed for available nutrients more effectively than bone, and bone more effectively than flesh (muscle and fat). Growth of nerve tissue and bone was not depressed as much as that of the fetus as a whole, but growth of flesh more so. The alimentary tract was less affected than the heart; the heart, less than the lungs and kidneys, and the latter, in turn, less than the thymus, spleen and liver.

Wallace concludes that the manner in which the weight increment made by the fetus during any particular period is distributed among the component parts of the body will depend on the extent to which the nutritive conditions then prevailing are limiting the rate of growth of the fetus.

THOMAS, Philadelphia [ARCH. NEUROL & PSYCHIAT.].

THE RELATIVE BIOLOGICAL VALUES OF THE PROTEINS IN CEREAL GRAINS. BARNETT SURE and FRANCES HOUSE, J. Nutrition **36**:595 (Nov.) 1948.

Sure and House state that the purpose of this investigation was to determine the relative biologic values of the proteins in rice, wheat, rye and corn, in both the milled and the unmilled states. Because of the low nitrogen content of rice, it was necessary to feed these cereal grains in such proportions as to introduce into the rations a total of not more than 5 per cent proteins (Mitchell nitrogen balance method). Net protein utilization was the value for the true coefficient of digestibility multiplied by the biologic value, divided by 100. The net protein utilization for the milled cereal grains was as follows: rice, 75.1; wheat, 60.0; rye, 63.1, and corn, 32.0. The results for the whole cereal grains were: rice, 80.0; wheat, 76.1; corn, 78.8, and rolled oats (oatmeal), 75.6.

FREDEEN, Kansas City, Mo.

REPRODUCTION AND LACTATION STUDIES WITH RATS FED NATURAL AND PURIFIED RATIONS. GEORGE M. MARUYAMA and P. H. PHILLIPS, J. Nutrition **36**:613 (Nov.) 1948.

From their studies, Maruyama and Phillips concluded that it is evident that in addition to other factors demonstrated to be helpful in reproduction and lactation—i. e., choline, vitamin B_6, inositol and biotin—the amino acids l (+)-lysine and dl-methionine, and folic acid are essential for good reproduction and lactation in female rats fed basal ration "T," which is essentially a ration of corn and soybean oil meal and 5 per cent alfalfa.

FREDEEN, Kansas City, Mo.

THE EFFECT OF MIXED TOCOPHEROLS ON MILK AND BUTTERFAT PRODUCTION OF THE DAIRY COW. P. H. PHILLIPS, JOSEPH KASTELIC and E. B. HART, J. Nutrition **36**:695 (Dec.) 1948.

Phillips and his associates observed that the inclusion in the ration of 1 Gm. of mixed tocopherols per cow daily does not influence the yield of milk or butterfat nor does it affect the percentage of butterfat present in the milk.

FREDEEN, Kansas City, Mo.

THE PLACENTAL AND MAMMARY TRANSFER OF TOCOPHEROLS (VITAMIN E) IN SHEEP, GOATS AND SWINE. FRANK WHITING and J. K. LOOSLI, J. Nutrition **36**:721 (Dec.) 1948.

Whiting and Loosli investigated the placental transfer and colostral storage of total tocopherols in sheep, goats and swine. Supplementing the prepartum ration with 80 mg. of mixed tocopherols per hundred pounds (45 Kg.) of body weight slightly increased the hepatic storage of tocopherols in the newborn animal, but the increase was not statistically significant. A highly significant increase in the tocopherol content of the blood plasma of the lambs and kids resulted from the prepartum supplementation, but no increase was observed in swine. Prepartum supplementation caused a twofold increase in the tocopherol content of the colostrum in all species. Colostrum contained three or four times as much tocopherol as the milk obtained from the same animals four days later.

FREDEEN, Kansas City, Mo.

PROTEIN AND AMINO ACID THERAPY. ROBERT ELMAN, Minnesota Med. **30**:493 (May) 1947.

The author discusses the subject in this paper under the headings of general considerations, historical survey, relation of body protein to plasma albumin, the recognition of protein deficiencies and therapy. Special emphasis is placed on the distinction between acute and chronic protein deficiency. Any patient who has lost a significant amount of protein-containing fluid will have acute protein deficiency, particularly acute hypoproteinemia. This can occur in severe hemorrhage, extensive burns, intestinal obstruction, peritonitis, empyema, pneumonia, severe tissue injury or extensive draining wounds or sinuses. Therapy is usually simple and effective because a transfusion of either whole blood or plasma replaces at once that which is missing and is permanently effective as long as no further losses occur.

When the loss of protein occurs because of tissue breakdown with excretion of urea and ammonia in the urine, as might occur in certain diseases, particularly fever and extensive trauma, chronic protein deficiency can result. Two features should be emphasized in consideration of therapy: First, an adequate intake must be started at the very beginning. If protein deprivation persists, the problem becomes magnified greatly. Second, an adequate protein intake cannot be left to chance or to the usual types of dietary procedures. The oral route is obviously the best for the administration of protein. The parenteral route for the injection of needed protein must be used only on the most definite indications. Since practical suggestions are made, the paper should be consulted.

STOESSER, Minneapolis.

THE VOLUME OF EXTRACELLULAR BODY FLUIDS IN MALNUTRITION. E. KERPEL-FRONIUS and S. KOVACH, Pediatrics **2**:21 (July) 1948.

The volume of extracellular body fluid, as measured by the thiocyanate method, was observed to increase considerably per kilogram of body weight in malnutrition. In severe malnutrition nearly half of the body is made up of extracellular water. The absolute amount of the latter is, however, decreased, though proportionately to a smaller extent than the amount of fat and protoplasmic tissue. The amount of cellular tissue is consequently even smaller than indicated by the proportion of the actual weight of the marantic infant to the ideal weight of healthy infants of the same age. The greater hydrolability of marantic infants has, in the authors' opinion, some bearing on the described change in the distribution of body fluids.

FROM THE AUTHORS' SUMMARY.

Vitamins; Avitaminoses

THE ROENTGEN DIAGNOSIS OF RICKETS ASSOCIATED WITH OTHER SKELETAL DISEASES OF INFANTS AND CHILDREN. RALPH S. BROMER and ROLFE M. HARVEY, Radiology **51**:1 (July) 1948.

Cases are presented which illustrate some of the roentgenologic signs of both rickets and scurvy and which were thought to represent involvement due to concurrent deficiency in vitamins D and C. An infant with a positive Wassermann reaction and suggestive syphilitic changes in the bones of the forearm died at 2 months of age. Autopsy specimens showed lesions which were interpreted as characteristic of rickets. The occurrence of rickets and scurvy in a child with fragilitas ossium and of rickets in one with erythroblastic anemia and lead poisoning was discussed. In this last child "lead lines" in the long bones were absent in the early stages but appeared coincidentally with the healing of the rickets.

ANSPACH, Chicago.

FURTHER OBSERVATIONS ON THE SIGNIFICANCE OF THE BLOOD PYRUVIC ACID LEVEL IN INFANCY. E. C. ALLIBONE, Arch. Dis. Childhood **23**:7 (March) 1948.

The elevated blood pyruvic acid level encountered during infancy in toxemia and hemolytic states is not associated with a deficiency of thiamine and is probably unrelated to any of the known factors in the vitamin B complex. The implication of these observations in relation to the intermediate metabolism of carbohydrate is discussed. A test for the diagnosis of subclinical states of thiamine deficiency is suggested.

KELLY, Milwaukee.

PTEROYLGLUTAMIC ACID (FOLIC ACID): THERAPEUTIC INDICATIONS AND LIMITATIONS. L. S. P. DAVIDSON, Edinburgh M. J. **55**:400 (July) 1948.

The name "folic acid" has been applied to a variety of products of varying degrees of purity obtained from different animal and vegetable tissues by different technical procedures. Synthetic folic acid is actually pteroylglutamic acid. The mechanism of action of pteroylglutamic acid is poorly understood. Deficiency of this vitamin may result either from a deficient intake and/or absorption of its precursor in the diet or from a defective production of the essential factor present in purified liver extract. The exact nature of this liver factor and its relation to pteroylglutamic acid deficiency are not clear.

Pteroylglutamic acid produces hemopoietic response only in patients with megaloblastic anemias; but improvement in alimentary symptoms and general health may occur in some patients having the sprue syndrome with normoblastic anemia. Pteroylglutamic acid is the agent of choice in treatment of pernicious (megaloblastic) anemia of infants and nutritional (tropical) megaloblastic anemia. It may be used with good effect in the treatment of the sprue syndrome with megaloblastic anemia, a condition which fails to respond adequately to parenteral and oral liver therapy combined with suitable dietetic measures.

Pteroylglutamic acid is not recommended for use in the treatment of addisonian pernicious anemia. There is evidence that in this disease the use of the drug might actually increase the liability to involvement of the nervous system. For this reason, the vitamin should be used for only brief periods in the treatment of any of the megaloblastic anemias.

MACDONALD, Pittsburgh.

INCREASED INCIDENCE OF RICKETS IN DYSTROPHIC CHILDREN. L. BORCHERDING, Arch. f. Kinderh. **133**:107 (March) 1947.

It is generally assumed that undernourishment will inhibit the growth of the bones and, thus, prevent the development of rickets. However, during the period of great social distress in Germany from 1942 to 1945 a large number of dystrophic infants was observed who exhibited mild but definite clinical symptoms of rickets. Several of these infants were less than 6 months of age.

ARON, Chicago.

THE SIGNIFICANCE OF VITAMIN K IN PEDIATRICS: VI. LATENT HYPOPROTHROMBINEMIA IN HEALTHY CHILDREN. A. BÁNOS, Arch. f. Kinderh. **133**:1, 1946.

A definite prolongation of the prothrombin time was observed in 8.5 per cent of healthy Hungarian children 2 to 15 years of age. Two thousand determinations were performed on 840 children, 411 boys and 429 girls. No relationship of hypoprothrombinemia to age, sex, body weight or nutritional status of the children was ascertained. The majority of cases of the condition were observed during the fall or early winter, with a peak in December. The author concluded that lack of vitamin K must be the cause of the hypoprothrombinemia, since the disorder was relieved by administration of the vitamin.

ARON, Chicago.

HISTOLOGIC EFFECT OF MASSIVE SINGLE DOSES OF VITAMIN D IN NONVIABLE INFANTS. KURT PALMÉN, Nord. med. (Hygiea) **30**:820 (April 12) 1946.

Seven newborn infants with fatal deformities were given 12.5 mg. of vitamin D_2 (500,000 international units) in an investigation of the possible toxic effect of such large single doses of the vitamin. On histologic examination no evident changes could be demonstrated in the kidneys, adrenal glands, liver, spleen, aorta or heart muscle. Nor was there any clinically demonstrable injury in the 200 premature infants given the same large single dose of vitamin D_2 during the last four years. This method is considered to be the best for prevention of rickets in premature infants.

WALLGREN, Stockholm, Sweden.

CUMULATIVE EFFECT OF SUNLIGHT AS COMPARED WITH SEASONAL VARIATION OF RICKETS AND TETANY. PAUL HORSTMANN and HELGE PETERSEN, Nord. med. (Hospitalstid.) **30**:1297 (June 14) 1946.

The variation in the cumulative effect of sunlight was computed, with certain simple assumptions, and the curve resulting from this reckoning exhibited a maximum in September and a minimum in March. An investigation of incidence among

1,259 cases of rickets and 478 cases of infantile tetany showed a maximum in March and a minimum in September. The curve for the seasonal variation of the cumulative effect of sunlight was suggested to give a fairly accurate picture of the seasonal variation in the amount of vitamin D in children's bodies.

WALLGREN, Stockholm, Sweden.

VITAMIN D POISONING. JORMA JÄÄSKELÄINEN, Nord. med. (Finska läk.-sällsk. handl.) **30**:1308 (June 14) 1946.

A boy 8½ months of age was given 10,000,000 international units of vitamin D_2 by his mother during one week. Four days later the infant suddenly became ill with serious toxic symptoms: vomiting, somnolence and oliguria, and, a little later, hematuria, edema, dyspnea and constipation. He died a fortnight later with signs of renal and pulmonary deficiency. At the postmortem examination deposits of calcium oxide were observed in the kidneys and the lungs. Degenerative changes were seen in the liver and the lungs. There was necrosis of the left kidney through venous thrombosis, with no sign of inflammation.

WALLGREN, Stockholm, Sweden.

VITAMIN D POISONING. HUGO JELKE, Svenska läk.-tidning. **43**:1372 (May 24) 1946.

This is a report on 2 cases. The first was of a girl 1½ years of age, who received 6,200,000 international units of vitamin D_2 in seven weeks for rickets. One week after the beginning of treatment, she displayed anorexia, vomiting and thirst. Her condition became worse and, finally, she could not be out of bed. At the examination signs of serious renal injury were seen, with hyposthenuria, polyuria, an increased nonprotein nitrogen level, an increased calcium content of the blood (15.9 mg. per hundred cubic centimeters), increased phosphatemia (12.9 mg. per hundred cubic centimeters), roentgenologically demonstrable increased calcification of the distal metaphyses of the femurs and electrocardiographic changes. She was discharged in good condition after three months' treatment.

The second case was of a girl 9 months of age. Her weight at birth was 2,800 Gm. and she was given artificial feeding. As a prophylactic measure, she received 500,000 international units of vitamin D_2 four times at two month intervals; in all, 2,000,000 international units was given. After the second dose, she had anorexia, which became still more accentuated after the third dose. At the examination she was somewhat pale. Blood calcium measured 12.2 mg. and blood phosphorus 5.5 mg. per hundred cubic centimeters. There were no signs of cardiac or renal disease. The anorexia disappeared after two weeks; the body weight increased normally, and she was discharged from the hospital in good condition.

WALLGREN, Stockholm, Sweden.

DOES ANEURIN PYROPHOSPHATE (COCARBOXYLASE) OCCUR IN URINE? J. GOUDSMIT and S. DE JONG, Nederl. tijdschr. v. geneesk. **90**:617 (June 8) 1946.

The authors determined the amounts of free and total thiamine (aneurin) in a number of samples of urine to corroborate the results of an investigation by Kraut, Weischer and Stumpff *(Biochem. Ztschr.* **308**:309, 1941), who concluded that an important part of thiamine is excreted as pyrophosphate. However, their results could not be confirmed. The methods used for the determination of free and total thiamine are given in detail.

VAN CREVELD, Amsterdam, Netherlands.

Hygiene; Growth and Nutrition; Public Health

NOTES ON A MIXED SHORT-TERM DAY NURSERY. J. F. Dow, Brit. M. J. **2**:21 (July 7) 1945.

This article is not very illuminating. It describes a nursery for children from infancy to the age of 5 years. Some were permanent residents, while others were left at the nursery for the day only. The results were satisfactory from the standpoint of such matters as the babies' health and the gain in weight. Much credit was frankly given to the matron in charge of the nursery.

BIRDSONG, University, Va.

ZAMBRINI'S PTYALO REACTION IN SCHOOL CHILDREN. ADRIANA POLVANI, Riv. di clin. pediat. **45**:369, 1947.

The author, after describing the results obtained in the various fields of medicine with the application of the Zambrini ptyaloreaction, elicited it in 316 children and concluded that the reaction is greatly important in the valuation of health in school children.

FROM THE AUTHOR'S SUMMARY.

SCHOOL HYGIENE ORGANIZATION IN SWEDEN. C. W. HERLITZ, Nord. med. **31**:1507 (July 12) 1946.

Herlitz, the chief school medical officer in Sweden, gives a short description of the school hygiene organization. The number of school children is, at present, 800,000 and the number of school medical officers 800. The state pays all the costs of the health program in ordinary schools and about 50 per cent of the costs in other schools. In every school with a medical officer there must be a school nurse, who if it is required visits the pupils' homes. The work is principally prophylactic. Each pupil is given a physical examination, including a compulsory tuberculin test (with up to 1 mg. of tuberculin), three times during his years at school, besides which all pupils needing attention are referred to the medical officer by the parents or the teachers. In larger schools the medical officer has a consultation hour once a week. Children who are finishing their school work are given vocational guidance. Great importance is attached to collaboration with the children's homes, contact with which is best maintained by the school nurses. Even the teachers must take an active part in hygiene work in the schools.

WALLGREN, Stockholm, Sweden.

Prematurity and Congenital Deformities

UNDERDEVELOPMENT OF THE MANDIBLE AS A SIDE EFFECT OF IRRADIATION THERAPY. P. KISFALUDY, Paediat. danub. **2**:114 (Aug.-Sept.) 1947.

In a 10 year old patient, radium treatment applied in the oral cavity and deep irradiation in the course of which 2,500 r had been given in fractions to both submandibular regions resulted in an isolated symmetric underdevelopment of the mandible which first could be observed at 13 years of age.

The developmental disturbance is to be ascribed to the deep roentgen irradiation. This assumption is favored by the even alteration of both sides of the bone. The radium treatment, acting on a small area only and manifesting itself at the base of the tongue, would have given rise to a unilateral developmental disturbance.

The liability of the permanent teeth to undergo caries is a striking symptom.

FROM THE AUTHOR'S SUMMARY.

ADMINISTRATION OF VITAMIN E TO PREMATURE INFANTS AS A PREVENTIVE MEASURE. F. GERLÓCZY and C. NÁVORI, Paediat. danub. **2**:266 (Nov.) 1947.

No scleredema was observed in 136 premature infants who had been given 30 mg. of vitamin E on one day and 110 mg. on the next.

FROM THE AUTHOR'S SUMMARY.

FIVE CASES OF HEMIHYPERTROPHY. LARS GRAM, Nord. med. (Norsk mag. f. lægevidensk.) **30**:1061 (May 10) 1946.

This is a short report on 5 cases of hemihypertrophy in children, 3 months to 7 years of age. In 1 of them the malformation was combined with a nevus flammeus affecting the hypertrophied side. WALLGREN, Stockholm, Sweden.

A HEREDITARY SYNDROME: MALFORMATION OF THE TONGUE AND POLYDACTYLY. ODVAR CLAUSSEN, Nord. med. (Norsk mag. f. lægevidensk.) **30**:1147 (May 24) 1946.

A description is given of 2 children belonging to two different families between which there was consanguinity; in one of the families the parents were also consanguineous. In the 2 children the tongue had a furrow in the median line and its apex was cleft. There were four prominences on its surface. The polydactyly involved both the hands and the feet. In the first family the child had 2 normal sisters and 1 normal brother, while 3 brothers had had congenital deformities and died during their first year of life. In the second family the child had 1 normal brother. Genealogic investigation showed that the malformations were caused by a recessive gene. WALLGREN, Stockholm, Sweden.

Newborn

EFFECTS OF CUP, BOTTLE AND BREAST FEEDING ON ORAL ACTIVITIES OF NEWBORN INFANTS. HERBERT V. DAVIS, ROBERT R. SEARS, HERBERT C. MILLER and ARTHUR J. BRODBECK, Pediatrics **2**:549 (Nov.) 1948.

Sixty newborn infants, divided equally into three groups according to whether they were breast, bottle or cup fed, were studied to see whether there were any differences in oral or general behavior during the first ten days of life. Observations were concerned with measuring: (1) the amount of all types of oral behavior: tongue sucking, mouthing and attempted oral play, including head turning as in seeking for the breast, and the effort to bring objects to the mouth, (2) the response to a sucking test consisting of putting a cotted finger into the baby's mouth and measuring the duration of sucking effort, (3) the amount of crying and (4) the interest in food. All tests were made in a standard manner and in relation to time of feeding.

The only significant differences noted among the three groups was a definite increase in the amount of response of breast-fed infants to the sucking test during the last seven days of the ten day period as compared to that of the bottle-fed and cup-fed groups. This difference was interpreted as indicating that the sucking drive of newborn infants possibly is partly learned and is not simply an innate process. This concept is based on the fact that breast-fed infants have to suck harder than bottle-fed or cup-fed infants to obtain food, hence they learn to suck more vigorously. FROM THE AUTHORS' SUMMARY.

PRENATAL ESTIMATION OF BIRTH WEIGHT BY PELVICEPHALOMETRY. S. W. DONALDSON and WILLIAM D. CHENEY, Radiology **50**:666 (May) 1948.

By using the Ball method of roentgen cephalometry, the authors measured the fetus in 338 of 8,083 patients admitted to the hospital. In 29 patients, measurements were considered abnormal to an extent that surgical intervention was advised and carried out successfully. To determine the percentage of accuracy within which weight at birth could be predicted from the calculated volume of the fetal head, a tabulation was made of the actual weight at birth compared with the predicted weight. Measurement of the fetal head was found to be as accurate as the measurement of the pelvic diameters. Volume could be calculated accurately from diameter and circumference of the head and it was found that volume was the most reliable criterion on which to predict weight at birth. Other unmeasurable factors, such as skeletal, fatty and muscular development, influence the weight at birth more than the circumference of the head.

In conclusion, the authors state that, while cephalometry is the only basis on which the weight at birth could be predicted with any degree of accuracy, inability to ascertain the actual weight within 8 ounces (227 Gm.) in 2 of 3 cases rendered the process of doubtful practical value.

ANSPACH, Chicago.

PHYSICAL REQUIREMENTS OF A ROOMING-IN PLAN. J. C. MONTGOMERY, in SENN, M. J. E.: Problems of Early Infancy. Transactions of the First Conference, March 3-4, 1947, New York.

Motion pictures and slides were shown illustrating the physical requirements of a rooming-in plan for a mother and baby.

McGUIGAN, Evanston, Ill.

REPLACEMENT TRANSFUSION IN ERYTHROBLASTOSIS FOETALIS (REPORT OF TWENTY-FOUR CASES). W. T. MUSTARD and JOHN FRASER, Canad. M. A. J. **59**:378 (Oct.) 1948.

In 24 cases of erythroblastosis fetalis treated by replacement transfusion, 3 deaths occurred. The technic used is briefly described. The authors are of the opinion that replacement transfusion is the best treatment available at present.

McGUIGAN, Evanston, Ill.

ON THE DETECTION, DIFFERENTIATION, AND TITRATION OF ANTI-RH ANTIBODIES. BRUCE CHOWN, MARION LEWIS and ANNA BYCE, Canad. M. A. J. **59**:379 (Oct.) 1948.

The authors present two simple methods for the detection, differentiation and titration of Rh antibodies. Methods and interpretations are given in detail.

McGUIGAN, Evanston, Ill.

OSTEOMYELITIS OF THE NEWBORN. FERGUS J. O'CONNOR JR., Canad. M. A. J. **59**:569 (Dec.) 1948.

A case of osteomyelitis diagnosed at 28 days of age is discussed. The infant died when he was 79 days old, despite therapy with penicillin and sulfadiazine and blood transfusions.

McGUIGAN, Evanston, Ill.

OBSERVATIONS ON HAEMOLYTIC DISEASE OF THE NEWBORN. RONALD R. GORDON, Arch. Dis. Childhood **21**:225 (Dec.) 1946.

In the differential diagnosis of hemolytic disease of the newborn, a history of previous stillbirths is of some importance in indicating maternal sensitization to the Rh factor, but a history of previous abortions is of no such importance. Other conditions may simulate the disease entity of icterus gravis neonatorum.

Since the introduction of treatment by transfusion with Rh-negative blood, the mortality rate in all cases of icterus gravis neonatorum has fallen from 61.4 to 32.7 per cent and in cases in which one or more transfusions were given, from 55.7 to 25 per cent. The reason mortality is still so appreciable is the hepatic dysfunction which is present in the severer forms of the disease.

KELLY, Milwaukee.

THE TREATMENT OF ERYTHROBLASTOSIS FOETALIS. I. A. B. CATHIE, Arch. Dis. Childhood **21**:229 (Dec.) 1946.

The indications for and the methods of giving blood to erythroblastotic babies are discussed and described. Illustrative cases are cited.

Experimental work in cases of erythroblastosis is reported to show: (*a*) the duration of sensitization of fetal red cells by maternal antibody; (*b*) contraindication of the transfusion of Rh-positive blood, and (*c*) overstimation of the dangers of feeding breast milk containing atypical antibodies.

KELLY, Milwaukee.

THE p_H OF THE MOUTH IN THE NEWBORN INFANT. JOHN THOMSON, Arch. Dis. Childhood **23**:48 (March) 1948.

Some observations on the p_H of the oral fluid in the newborn infant are recorded. They show that the p_H increases in acidity from day to day for the first seven days of life. The statement of Liston and Cruickshank (*Edinburgh M. J.* **47**:369, 1940) that the mouth of the suckling infant is a moist acid surface is substantiated so far as the first nine days of life are concerned.

KELLY, Milwaukee.

ON THE CAUSE OF NUCLEAR JAUNDICE IN NEONATAL SEPSIS WITH JAUNDICE. J. I. DE BRUYNE and S. VAN CREVELD, Arch. Dis. Childhood **23**:84 (June) 1948.

In 2 cases of septic icterus in the newborn combined with nuclear jaundice which were previously described, the examination of the parents and the clinical anamnesis of the children born since 1937 showed that Rh immunization was fairly certain in the first case, while in the second, in which no clinical indications for this conception were present, results of the examination of the blood also spoke to a certain degree in favor of an Rh immunization. In a third case recently observed, the Rh relations in the parents and the patient also pointed to an Rh immunization. In a fourth case, Rh tests of the parents and patient did not indicate Rh immunization, but the possibility of immunization by blood group A could not be excluded.

KELLY, Milwaukee.

CAUSE AND SIGNIFICANCE OF SEASONAL VARIATION IN THE HAEMORRAGIC TENDENCY IN THE NEWBORN. E. KERPEL-FRONIUS, F. VARGA and E. KÁTAI PÁL, Arch. Dis. Childhood **23**:87 (June) 1948.

Capillary fragility shows a decided seasonal variation, while capillary permeability is not influenced by the seasons. The higher frequency of cephalhematomas and cerebral hemorrhage in winter and spring seems to be linked with a parallel seasonal variation in capillary fragility and prothrombin deficiency. The parallelism in the seasonal decrease in prothrombin level and in capillary resistance suggests a simultaneous deficiency of both vitamins K and P in the maternal diet during winter and spring. As a prophylactic measure, therefore, it is suggested that vitamins K and P be given simultaneously during the last months of pregnancy.

KELLY, Milwaukee.

SEPTICAEMIA OF THE NEWBORN. McLAREN TODD, Arch. Dis. Childhood **23**:102 (June) 1948.

Fifteen cases of neonatal septicemia seen at a children's hospital in London during 1946 are reported, with clinical observations and results of pathologic investigations.

The infrequency of diagnostic clinical findings is stressed. Loss of appetite, failure to gain weight (or loss of weight) and diarrhea were common findings. The temperature was rarely elevated above 100 F.; jaundice was infrequent, and a palpable spleen was rare. The level of the white blood cell count was not of value in diagnosis, but the high percentage of immature cells was of considerable importance. The culture of the blood was an important part of investigation in a newborn baby who failed to gain weight but in whom abnormal clinical signs were minimal or absent.

The treatment suggested is a minimum dosage of 3,000 units of penicillin per pound (0.5 Kg.) of expected body weight every twenty-four hours, in six hourly doses intramuscularly, together with 0.25 Gm. of a sulfonamide drug per pound per twenty-four hours. The combined treatment should be started before the results of investigations are known. The results of treatment in this series of patients were disappointing. There were 8 deaths.

KELLY, Milwaukee.

HAEMOLYTIC DISEASE OF THE NEWBORN IN SOUTH AFRICAN NATIVES. A. ZOUTENDYK, South African M. J. **21**:794 (Oct. 25) 1947.

Zoutendyk reports 3 cases of hemolytic disease of the newborn occurring in native patients, which in his opinion are the first reported in this racial group. He points out that the cases tend to show that the Rh status of those becoming sensitized differs from that of Europeans. All 3 mothers were Rh positive. Sensitization of an Rh-negative Negro woman has yet to be encountered, whereas 90 per cent of sensitized European mothers are Rh negative. Rh-negative blood occurs in only 5 per cent of native mothers. Since routine Rh testing in native mothers is impractical, best results depend on early diagnosis and prompt transfusion. The possibility of sensitization must always be kept in mind even in Rh-positive women, as these cases demonstrate.

MCGUIGAN, Evanston, Ill.

COMPLEX METABOLIC SYNDROME IN A NEWBORN INFANT WITH ACUTE MENINGITIS. AUGUSTO GENTILI, Riv. clin. pediat. **45**:321, 1947.

The author describes a case of meningitis, due probably to Neisseria intracellularis (Weichselbaum's coccus), in a newborn infant, with apparently normal spinal fluid. The case is interesting because the author has studied it from chemicoclinical and histopathologic points of view, which demonstrated complex metabolic disorders.

The principal data are:

A great increase occurred in the spinal fluid sugar to a level never before reported in the literature, 2.22 Gm. per liter; increases in blood sugar (1.42 Gm. per liter), with glycosuria and ketonuria, and in the blood lipid concentration also took place, with an increase in the spinal fluid chlorides.

Serial sections of nervous tissue showed no evidence of a pathologic basis for these metabolic disorders.

The author is of the opinion that the syndrome is due to the altered function of the hypothalamus; the much greater amount of sugar in the spinal fluid than in the blood is explained as due to a specific activity of the ependymal cells in the production of glucose or to a delayed and poor reabsorption of the spinal fluid.

FROM THE AUTHOR'S SUMMARY.

FRACTURE OF THE CLAVICLE IN THE NEWBORN. CARLOS RAMIREZ BRAVO and ROBERTO GALECIA GOMEZ, Rev. chilena de pediat. **6**:413 (June) 1947.

The authors call attention to an apparent disproportion between the number of fractures and the number of deliveries, as observed from year to year. Thus, between 1941 and 1944 no fractures were observed in 7,920 deliveries, whereas, in 1944, 2 fractures were diagnosed among 3,477 deliveries. In 1945, 44 fractures were diagnosed in 3,193 deliveries, and in 1946 there were 26 fractures encountered in 3,948 deliveries. Diagnostic signs consisted of pain on pressure over the affected area and osseous crepitation. Roentgenologic confirmation was obtained in all cases. The authors conclude that fractures of the clavicle, in their experience, were more frequent in normal deliveries and in those infants whose weight at birth was above normal. They discuss the mechanisms by which fracture is produced and the treatment. They employed immobilization for a period of ten to fifteen days which they regard as sufficient time for the formation of callus.

KALISKI, San Antonio, Texas.

RH FACTOR IN THE NETHERLANDS. J. J. VAN LOGHEM JR., M. VAN DER HART and A. HEEMSKERK, Nederl. tijdschr. v. geneesk. **91**:360 (Feb. 15) 1947.

Nine hundred and fifty-six donors of blood groups O, A, B and AB of the Amsterdam Blood Transfusion Service were tested as to the Rh factor. Of the persons, 131 (13.7 per cent) were Rh negative (rr = cde/cde). Of the total 1,496 tests, 13.6 per cent gave Rh-negative results.

In the 1,496 tests subtype Rh′ was found in 0.33 per cent, and subtype Rh′′ in 0.20 per cent.

The methods of typing the serums are described. The titers of agglutinins occurring simultaneously may show large variations. A simple method of isolating those rare agglutinins, anti-Rh′ (anti-C) and anti-Rh′′ (anti-E), from serums with combined agglutinins is mentioned.

VAN CREVELD, Amsterdam, Netherlands.

Acute Contagious Diseases

TRIAL OF WHOOPING-COUGH VACCINE IN CITY AND RESIDENTIAL NURSERY GROUPS: A REPORT TO THE MEDICAL RESEARCH COUNCIL. A. M. MCFARLAN, ELIZABETH TOPLEY and MARY FISHER, Brit. M. J. **2**:205 (Aug. 18) 1945.

In this study more than 710 children 6 months to 3 or 4 years of age from welfare clinics and residential and day nurseries were used: about one-half were inoculated against whooping cough and one-half were used as controls. Whooping cough occurred sporadically in the community during the succeeding eighteen months and broke out in four of the residential nurseries two weeks to nine months after the last inoculation.

No significant difference was observed in the incidence of or severity of whooping cough between the inoculated and the control children. Of the 327 inoculated children, 12.5 per cent, and of the 305 controls, 14.1 per cent, acquired definite whooping cough.

The article suggests that vaccination against pertussis is of no value. It is well to note that the total dosage used contained from 40,000,000,000 to 100,000,000,000 organisms, corresponding to an American dosage of about 120,000,000,000 to 300,000,000,000 organisms, because higher strengths gave reactions in the children vaccinated.

BIRDSONG, University, Va.

SPINAL PUNCTURE IN DIAGNOSIS OF ACUTE ANTERIOR POLIOMYELITIS (HEINE-MEDIN DISEASE). PIO LUCIANI, Riv. clin. pediat. **45**:466 (Aug.) 1947.

From systematic researches on the spinal fluids of 100 children, from 3 months to 10 years of age, with various clinical forms and in various phases of acute anterior poliomyelitis (Heine-Medin disease), it was observed that the modifications in the spinal fluid as classified by Meyer are not always perceivable or constant. Therefore, to date, it has not been possible to fix typical modifications of the spinal fluid for all types of poliomyelitis.

However, the examinations of the spinal fluid, repeated in series, permitted the authors to define several interesting details useful for the diagnosis and study of the relationship of the spinal fluid to the various clinical forms of the disease.

FROM THE AUTHOR'S SUMMARY.

DIPHTHERIA IN PERUGIA IN RELATION TO ANTIDIPHTHERITIC VACCINATION. VINCENZA LOSITO BALDASSERINI, Riv. clin. pediat. **45**:491 (Aug.) 1947.

The author, through a clinical and statistical study (of the nine years 1936 to 1944) on nearly 600 cases of diphtheria in Perugia, with particular attention to the children hospitalized in the Children's Clinic and with reference to a preceding study, has established that the morbidity and mortality per 10,000 inhabitants have been maintained at a low level, while the lethality has increased except among children 2 years old. Among the vaccinated children of the municipality, the morbidity was low (0.25 per cent). Among the vaccinated children hospitalized in the clinic the morbidity was 7.1 per cent and the lethality 15 per cent.

FROM THE AUTHOR'S SUMMARY.

IMPORTANCE OF THE CONTINUOUS OR RECIDIVATING ACTIVITY IN RHEUMATIC FEVER IN CHILDHOOD. JUAN R. DIAZ NIELSEN, Arch. argent. de pediat. **27**:26, 1947.

Rheumatic fever is characterized in childhood by a tendency to maintain its inflammatory activity either continually or by relapses. As a rule, there is a relapse

after the healing of the primary process. In continuous or recidivating activity, there are four clinical forms: malignant, chronic active, recurrent active and permanently inactive.

A stable, residual, inactive cardiopathy, even with severe valvular lesions, can be tolerated for a long time without decompensation. When the process relapses frequently, tolerance diminishes and the severity of the process increases. Though the relapses may appear under the clinical form of an arthritis or a carditis, the more frequent and prolonged the relapses are, the more they resemble the clinical form of carditis. Successive relapses cause cardiac dilatations and reversible inflammatory decompensations, as well as endocardial lesions which are severer and more limiting with each relapse. The continuation of the activity or the relapses transform the child into an invalid or lead to an early death.

The medical profession and society in general must unify their efforts in fighting relapses by means of social education, frequent physical examinations, elimination of septic foci and use of medicinal agents. FROM THE AUTHOR'S SUMMARY.

IMMUNIZATION WITH DIPHTHERIA TOXOID AND SAUER PERTUSSIS VACCINE DURING AN EPIDEMIC OF WHOOPING COUGH. J. G. MENDEZ, Arch. argent. de pediat. **27**:49, 1947.

Vaccination with Sauer's vaccine in 73 children during an epidemic showed that: (1) The vaccine produced immunity to whooping cough; (2) according to the author's experience, such immunity appeared early; (3) the vaccine did not show therapeutic properties; (4) its use was well tolerated, and (5) in children who were in the incubation period of whooping cough and in 1 child who had the disease before, the use of the vaccine caused reactions no different from those observed in most of the vaccinated children. The vaccine did not influence the development of the disease in the aforementioned children.

FROM THE AUTHOR'S SUMMARY.

EPIDEMIOLOGY OF POLIOMYELITIS. HANS ZELLWEGER, Schweiz. Arch. f. Neurol. u. Psychiat. **53**:241, 1944.

No race appears to be immune to poliomyelitis. Although morbidity rates are somewhat higher in northern countries, epidemics have been observed in regions near the equator. Like other countries of middle Europe, Switzerland experienced a pronounced increase in the number of reported cases during the years 1936 to 1941, inclusive. The morbidity seemed slightly less at altitudes above 1,000 meters than at lower altitudes. The author's epidemiologic studies tend to confirm current views regarding spread of the disease through close personal contact and fecal contamination. As evidence against the older theory of droplet infection, he adduces the fact that the presence of a large gathering of boys from all parts of Switzerland in Zurich during the height of an epidemic was not followed by the appearance of the disease in previously uninfected areas. The index of contagion, furthermore, is much lower in schools than it is in homes, where infection through contact is more likely to occur.

Sporadic cases of poliomyelitis tend to appear in or near localities visited by the disease in previous years. In or near these places, small epidemics develop at times and, through radial spread, may grow into small area epidemics. Through further extension, local outbreaks may coalesce to form epidemics covering large areas. This phenomenon is more difficult to demonstrate in cities than it is in less

thickly populated regions. The author expresses the view that the virus is not so ubiquitous as it has generally been assumed to be in the past. The great difference in annual morbidity rates has yet to be accounted for.

DANIELS, Denver [Arch. Neurol. & Psychiat.]

PROGRESSIVE BULBAR PARALYSIS AND ITS RELATION TO CHRONIC POLIOMYELITIS AND AMYOTROPHIC LATERAL SCLEROSIS. HANS RUDOLPH STAEHELIN, Schweiz. Arch. f. Neurol. u. Psychiat. **52**:270, 1943.

A woman 63 years of age, who had been receiving treatment for myxedema during the preceding eleven years, died of bronchopneumonia fifteen months after the onset of progressive bulbar paralysis. Fibrillary twitching was observed in the muscles of the extremities a few months before death, but there was no associated atrophy. The tendon reflexes were hyperactive, particularly on the left side. Microscopic study of the thyroid gland, which was small and fibrotic, revealed lymphocytic infiltration and extensive regressive changes in the parenchyma. The entire brain stem was involved in an inflammatory process characterized by lymphocytic infiltration of the leptomeninges, perivascular cuffing, proliferation of glial cells and destruction of ganglion cells with neuronophagia. These changes were more pronounced in the tegmentum pontis than in the midbrain and were most intense in the medulla oblongata. Destruction of ganglion cells was observed in the reticular formation, as well as in the nuclei of the cranial nerves, including the dorsal nucleus of the vagus and the vestibular nuclei. The lymphocytic infiltration within the brain stem was not entirely confined to the adventitial spaces, and small groups of extravasated red blood cells were observed. Sections from the spinal cord showed beginning degeneration of the lateral and anterior corticospinal tracts; these changes appeared first immediately below the pyramidal decussation. Early regressive changes in the anterior horn cells and the cells of Clarke's column were not accompanied with neuronophagia.

Staehelin expresses the belief that amyotrophic lateral sclerosis does not have a uniform cause. A number of cases have been reported in which perivascular infiltration was observed within the spinal cord and brain stem. The case he reports is unique in that bulbar paralysis was due to chronic polioencephalitis with pathoanatomic features strongly suggestive of acute anterior poliomyelitis (Heine-Medin disease), whereas the accompanying symptoms of eary amyotrophic lateral sclerosis were apparently due to purely degenerative changes within the spinal cord.

DANIELS, Denver [Arch. Neurol. & Psychiat.]

TONSILLECTOMY DURING CONVALESCENCE FROM DIPHTHERIA. EINO VAHERI, Nord. med. (Finska läk.-sällsk. handl.) **30**:951 (April 26) 1946.

In 88 cases, tonsillectomy was performed during convalescence from diphtheria to hasten the disappearance of the bacilli. It was observed that the bacilli disappeared within fourteen days after tonsillectomy in 90 per cent of those with the ordinary diphtheritic throat and in 78 per cent of those in which bacilli were demonstrated in the nose as well before operation. Satisfactory results were obtained in 4 cases of carriers. About six weeks after the onset of the disease is claimed to be the best time for the operation.

WALLGREN, Stockholm, Sweden.

BACTERIOLOGIC DIAGNOSIS IN WHOOPING COUGH. GÖSTA TUNEVALL, Svenska läk.-tidning. **43**:1254 (May 10) 1946.

The medium used consisted of blood potato-agar, with peptone, nicotinic acid and penicillin. The results of 190 examinations on 94 children, of whom 57 had evident whooping cough, are reported. Of the 67 examinations performed during the first three weeks, 61, or 91 per cent, of the cultures yielded organisms. The material for the tests was taken partly by pharyngeal swab and partly by permitting the child to cough against the culture plate. The cultures were kept in incubators for two to four days and then examined.

WALLGREN, Stockholm, Sweden.

PENICILLIN TREATMENT FOR CARRIERS OF DIPHTHERIA BACILLI. KARL-AXEL MELIN, Svenska läk.-tidning. **43**:1305 (May 17) 1946.

Local treatment with penicillin spray was given, in addition to injection of 2,500 oxford units of penicillin for ten days. In all, 253 children, most of whom could be considered as chronic carriers, were treated, and 136 were free from bacilli after the treatment. The author is of the opinion that better results could have been had if larger doses of penicillin had been used. The diphtheria bacilli were not penicillin resistant.

WALLGREN, Stockholm, Sweden.

COMPLICATIONS OF SCARLET FEVER AND RISK OF INFECTION. MARGIT LINDGREN, Svenska läk.-tidning. **43**:2133 (Aug. 23) 1946.

A study was made of the incidence of relapse among 5,029 patients with scarlet fever treated at the Hospital for Infectious Diseases, at Göteborg, Sweden, during the years 1937 to 1945 in relation to the incidence of complications in those with primary cases. The isolation time was five weeks. Statistical analysis showed that patients with complications probably are more infectious. By keeping patients with otitis, rhinitis and increased sedimentation rate isolated in the hospital until they are completely recovered, it is possible that relapse may be avoided.

WALLGREN, Stockholm, Sweden.

DIPHTHERITIC GINGIVITIS AND STOMATITIS. D. HOOGENDOORN, Nederl. tijdschr. v. geneesk. **90**:485 (May 18) 1946.

In 1826, Bretonneau described an epidemic of gingivitis which he had observed in soldiers in 1818. While he had gingivitis, one soldier also contracted laryngeal diphtheria. After this publication, the morbid picture of diphtheritic gingivitis seems to have disappeared totally from the literature. In 1944, Hoogendoorn observed a number of cases of diphtheritic gingivitis. His conclusion was that a case of gingivitis that does not react promptly to the usual treatment must be investigated for the presence of diphtheria bacilli. Formation of tartar on the teeth may give rise to the gingivitis. If the disease occurs epidemically or if contact with a patient having diphtheria is known, bacteriologic examination is decidedly necessary. When a positive bacteriologic result is obtained, specific treatment is indicated, especially in times of an epidemic of diphtheria.

VAN CREVELD, Amsterdam, Netherlands.

DIPHTHERITIC STOMATITIS AND GINGIVITIS. G. J. VAN LOOKEREN CAMPAGNE, Nederl. tijdschr. v. geneesk. **90**:571 (June 1) 1946.

All 5 cases described were of more or less atrophic infants. A membrane was seen on the tonsils, uvula and posterior wall of the pharynx. No rhinitis was present.

VAN CREVELD, Amsterdam, Netherlands.

Acute Infectious Diseases

THE USE OF GAMMA GLOBULIN FROM LARGE POOLS OF ADULT BLOOD PLASMA IN CERTAIN INFECTIOUS DISEASES. JOSEPH STOKES JR., Ann. Int. Med. **26**:353 (March) 1947.

Studies indicate that gamma globulin is the most satisfactory biologic product yet developed for the passive protection against measles for exposed susceptible persons or for the attenuation of the disease.

Evidence available tends to indicate that gamma globulin from plasma pools is not effective in amounts up to 50 cc. in protecting exposed susceptible persons against mumps. Adequate protection against infectious (epidemic) hepatitis is afforded by a dose of 10 cc. of gamma globulin. Such protection lasts for six to eight weeks. The protective dose has been demonstrated to be as small as 0.06 cc. per pound of body weight.

Large amounts of neutralizing antibodies were found in gamma globulin from pooled plasma. Treatment of poliomyelitis with gamma globulin, however, proved ineffective in both animals and man. Large doses of gamma globulin given well in advance of the onset of symptoms failed to decrease the severity of the disease.

From 2 to 5 cc. of gamma globulin is apparently sufficient to protect susceptible persons following exposure to rubella. Further studies are needed to substantiate the observations in this report.

READING, Galveston, Texas.

PRODUCTION OF ACUTE RHEUMATIC-LIKE HEART LESIONS IN MICE. FREDERICK J. MOORE, GERALD K. RIDGE, ROBERT W. HUNTINGTON, ERNEST M. HALL, GEORGE C. GRIFFITH and ROBERT G. KNOWLES, Proc. Soc. Exper. Biol. & Med. **65**:102 (May) 1947.

White of egg diluted with distilled water was injected intravenously and intraperitoneally into mice, usually four injections at various intervals of from two to seven days. Nine photomicrographs of the cardiac tissue from these animals are presented which demonstrate collagenous degeneration, perivascular infiltrations and degeneration, formation of verrucae and fibrinous and hydropic degeneration of myocardial fibrils. These lesions appear similar to those seen in acute rheumatic carditis in man and to those described by Rich in rabbits. Only minimal lesions were observed in control mice. There was no relation between severity of the clinical anaphylaxis and the carditis.

HANSEN, Galveston, Texas.

EFFECT OF PARA-AMINOBENZOIC ACID ON FEVER AND JOINT PAINS OF ACUTE RHEUMATIC FEVER. HERMAN ROSENBLUM and L. E. FRASER, Proc. Soc. Exper. Biol. & Med. **65**:178 (June) 1947.

Because paraaminobenzoic acid is of benefit in rickettsial disease, because rheumatic fever shows a vasculitis similar to that seen in rickettsial disorders and because both diseases are aggravated by sulfonamide administration, the authors

used this drug in the treatment of 9 patients (Negroes 6 to 12 years old) with acute rheumatic fever. Three to 4 Gm. of paraaminobenzoic acid powder was given as the first dose, followed by 1 to 3 Gm. every two to three hours. Alkalis were given to prevent acidosis.

In 7 of the children there was a prompt response, with fall in temperature and relief of joint pains. Three patients had secondary rises in the temperature while receiving the drugs. An unidentified reducing substance was detected in the urine in the majority of these children.

HANSEN, Galveston, Texas.

GIARDIASIS ASSOCIATED WITH RECURRENT RECTAL HAEMORRHAGES. GEORGE R. HEMMING, Brit. M. J. **2**:185 (Aug. 11) 1945.

This attack of giardiasis occurred in a 4 year old girl in the Fiji Islands. Although often symptomless, this child had fever, constipation, weakness and passage of blood in the stools. Examination of the stools repeatedly showed Giardia lamblia and Trichuris. The child was treated for both. The giardiasis responded to quinacrine hydrochloride ¾ grain (50 mg.) three times a day for five days. After ten days, she was given another course of this treatment.

BIRDSONG, University, Va.

KYPHOSIS IN TETANUS. W. T. SNOEK and N. SCHULTE, Nederl. tijdschr. v. geneesk. **90**:580 (June 1) 1946.

A case of kyphosis is reported in a boy 13 years of age with tetanus.

VAN CREVELD, Amsterdam, Netherlands.

OESOPHAGEAL STRICTURE FOLLOWING TYPHOID FEVER. S. C. CHATTERJEE, Indian J. Pediat. **14**:13 (Jan.) 1947.

A rare case of esophageal stricture as a complication of typhoid is presented.

McGUIGAN, Evanston, Ill.

KALA-AZAR IN INFANCY. J. E. DEBONO, Proc. Roy. Soc. Med. **40**:155 (Feb.) 1947.

Kala-azar is not necessarily a tropical disease and it could occur in any place south of the latitude of Paris. It is quite common in infants and young children. The youngest patient in the author's series was 4 months old. The pathologic changes, symptoms and treatment are fully discussed in the report.

WILLIAMSON, New Orleans.

TYPHOID INFECTION IN CHILDREN. F. PARADISO and A. LANZA, Riv. clin. pediat. **45**:449 (Aug.) 1947.

Among 418 cases of typhoid and paratyphoid fever in the three years 1943 to 1945 the authors report a mortality rate of 11.9 per cent. Serious complications (bronchopneumonia, intestinal hemorrhages, perforations and septic and cardiac manifestations) occurred in more than 25 per cent of all cases. From an examination of the clinical data, as well as from autopsy observations on 30 cases, it was revealed that the clinical aspect is dominated sometimes by a neurotoxic syndrome with slight intestinal phenomena, especially in the group about 3 to 12 years of age, and sometimes by septic complications. Anatomic data, however, never failed to reveal conspicuous hyperplasia of the intestinal lymphatic apparatus with escharotic formations in children in the first two years of life and even in those in the

first six months. These observations may be compared with those on the anatomicopathologic picture of typhoid in adults.

The authors ask themselves whether the severity of the anatomic findings, the clinical manifestations and the complications are in relation to a particular condition of the moment or whether the anatomic picture of typhoid infection in childhood, which is based on traditional data, should not be revised.

FROM THE AUTHORS' SUMMARY.

Chronic Infectious Diseases

A LABORATORY AND CLINICAL INVESTIGATION OF DIHYDROSTREPTOMYCIN. LAWRENCE B. HOBSON, RALPH TOMPSETT, CARL MUSCHENHEIM and WALSH MCDERMOTT, Am. Rev. Tuberc. **58**:501 (Nov.) 1948.

From observations on 12 persons with moderately or far advanced active pulmonary tuberculosis treated with dihydrostreptomycin (9 with the crude and 3 with the purified product), it appeared that the pharmacologic and antibacterial characteristics are similar to those of streptomycin but that certain quantitative differences between the two compounds may be of importance. In the larger doses used in this study dihydrostreptomycin caused vestibular dysfunction, hearing loss, renal damage and eosinophilia. It seemed, however, to be distinctly less neurotoxic than streptomycin, as judged by the length of therapy and total dose required to produce the "dizziness" characteristic of vestibular dysfunction. The disability resulting from vestibular damage seemed less than that resulting from streptomycin. Patients hypersensitive to streptomycin tolerated the dihydro derivative in doses up to 2 Gm. daily without untoward reaction.

The therapeutic results in this series were as good as those obtained with streptomycin. The newer drug should prove useful in patients unable to tolerate streptomycin because of hypersensitivity. The lower neurotoxicity of the dihydro derivative also suggests that it is preferable to streptomycin for the treatment of patients who require large doses or long courses of therapy with an antibacterial agent.

SMITH, Ogden, Utah.

THE CLINICAL ADMINISTRATION OF DIHYDROSTREPTOMYCIN IN TUBERCULOSIS. H. CORWIN HINSHAW, WILLIAM H. FELDMAN, DAVID T. CARR and HENRY A. BROWN, Am. Rev. Tuberc. **58**:525 (Nov.) 1948.

Streptomycin has become recognized as an indispensable aid in the medical and surgical treatment of certain forms of tuberculosis. The two principal handicaps to its more widespread use are (1) the frequent emergence of streptomycin-resistant strains of tubercle bacilli and (2) the toxic reactions, the most important of which is damage to the vestibular function of the eighth cranial nerve. The latter occurs most uniformly when larger doses are administered for a few weeks. Dihydrostreptomycin was administered to a small group of patients with various types of tuberculosis. Therapeutic effects were comparable with those resulting from the use of streptomycin, but the dihydro derivative was clearly much less toxic when given in comparable doses for similar periods. It was observed that dihydrostreptomycin may be administered in doses of 2 to 3 Gm. per day for sixty days or perhaps longer, with little danger of damage to the vestibular function. Several patients who were decidedly allergic to streptomycin were able to tolerate the derivative without unfavorable reactions.

The only unfavorable reaction noted was irritation of the tissues at the site of injection, which was appreciably severer than that produced by streptomycin. Intrathecal injection of dihydrostreptomycin is not recommended for treatment of meningitis until a less irritant form can be produced.

SMITH, Ogden, Utah.

TOXOPLASMOSIS IN CHILDREN. FORREST H. ADAMS, JOHN M. ADAMS, PAUL KABLER and MARIAN COONEY, Pediatrics **2**:511 (Nov.) 1948.

Five proved cases of toxoplasmosis in infants and 9 cases in which the clinical and laboratory evidence strongly suggested this diagnosis in infants and children are presented.

It is pointed out that only one or two of the cardinal manifestations may be evident in a patient in whom the diagnosis has been established by the finding of the typical pathologic lesions and the organism. This was the case in 2 of the patients reported on, both of whom had internal hydrocephalus but neither cerebral calcification nor chorioretinitis.

The presence of internal hydrocephalus, particularly with spinal fluid changes, such as elevated protein and pleocytosis, should suggest to the clinician the diagnosis of toxoplasmosis. When the classical triad or tetrad of symptoms and signs of the disease is present and the result of the neutralization test is positive, the diagnosis should probably be made, since isolation of the organism from the patient is so difficult at present. Jaundice can be the presenting complaint in a patient with congenital toxoplasmosis.

FROM THE AUTHORS' SUMMARY.

IN VITRO EFFECT OF STREPTOMYCIN AND PARA-AMINOSALICYLIC ACID (PAS) ON THE GROWTH OF TUBERCLE BACILLI. KIRSTEN VENNESLAND, ROBERT H. EBERT and ROBERT G. BLOCH, Proc. Soc. Exper. Biol. & Med. **68**:250 (June) 1948.

Stock cultures of strains of tubercle bacilli were treated with various dilutions each of streptomycin and paraaminosalicylic acid and in combination for variable periods of time. The results were checked with turbidimetric readings. There was no question that the combination of streptomycin and paraaminosalicylic acid is more effective than either drug alone when the organism is sensitive to streptomycin. If the organism is resistant to streptomycin, paraaminosalicylic acid inhibits the growth and addition of streptomycin does not enhance the effect.

HANSEN, Galveston, Texas.

A RAPID MOUSE TEST FOR LABORATORY DIAGNOSIS OF TUBERCULOSIS. ALBERT MILZER and EDWIN R. LEVINE, Proc. Soc. Exper. Biol. & Med. **69**:16 (Oct.) 1948.

Gastric mucin prepared by suspension of 5 Gm. of granular mucin in 100 cc. of distilled water, adjusted to p_H 7.4 and autoclaved, and aseptically obtained egg yolk diluted with isotonic sodium chloride solution enhanced the virulence of tubercle bacilli for pigmented mice. Grossly visable lesions containing large numbers of tubercle bacilli were usually present in ten to fifteen days after intraperitoneal inoculation of bacteria of H37 Rv strains, as well as of bacteria from patients.

HANSEN, Galveston, Texas.

A Case of Prenatal (Congenital) Syphilis. Ben Kanee, Canad. M. A. J. **59**:470 (Nov.) 1948.

The case of a child with prenatal syphilis, who was first seen at 5 weeks of age, is presented with a complete autopsy report. A plea is made for routine Kahn tests on cord blood as an aid to the diagnosis of prenatal syphilis.

McGuigan, Evanston, Ill.

A Case of Third-Generation Syphilis. C. J. V. Helliwell, Brit. M. J. **2**:186 (Aug. 11) 1945.

A 14 year old boy had a typical tabetic gait, a positive reaction to a Wassermann test on the spinal fluid and strong evidence of congenital syphilis. His mother, in turn, was congenitally syphilitic and was untreated. This is a rare case.

Birdsong, University, Va.

Leprosy in Childhood in Santiago, Cuba. Vicent Cot Lesmes, Rev. cubana de pediat. **18**:790 (Dec.) 1946.

The author outlines the modern ideas in regard to classification, bacteriologic pathoanatomic and immunologic aspects of leprosy and reviews some of the literature in regard to leprosy in childhood.

He studied in detail 75 cases of children and grouped them according to the South American classification into three types: (a) lepromatous, (b) tuberculoid and (c) nonspecific. A description of each type is given.

The city of Santiago has the highest incidence of leprosy in Cuba. The author states that children and adolescents are most susceptible to the disease and outlines steps which would aid considerably in reducing the incidence of leprosy in Cuba, the chief measure being separation of children from their parents who may have the disease and establishment of preventoriums for such children.

Keith, Rochester, Minn.

Age Variation of Predisposition to Tuberculosis. Sven Nissen Meyer, Nord. med. (Norsk mag. f. lægevidensk.) **30**:1323 (June 14) 1946.

Of the recently infected children of school age, 2 to 4 per cent contracted comparatively severe tuberculosis, while about 10 per cent of those from 19 to 25 years of age had severe tuberculosis after a primary infection. Thus, the risk of primary infection is greater in adolescent persons than in those of school age.

Wallgren, Stockholm, Sweden.

BCG Vaccination of Newborn Infants. Sigvard Jorup, Svenska läk.-tidning. **43**:149 (Jan. 18) 1946.

The author studied 201 cases of tuberculosis in children under 2 years of age who were treated at the children's hospitals in Stockholm. No tuberculous child vaccinated with BCG was admitted during the time of study. The author is of the opinion that if a general vaccination of newborn infants with BCG had been made most of these cases of tuberculosis could have been prevented; he strongly recommends this measure.

Wallgren, Stockholm, Sweden.

INFLUENCE OF WAR CONDITIONS ON BOVINE TUBERCULOSIS IN AMSTERDAM. A. C. RUYS, Nederl. tijdschr. v. geneesk. **90**:564 (June 1) 1946.

In 1939, the author reported that, in the cities of Holland with a population greater than 100,000, of children below the age of 15 years with pulmonary disorders, 9 per cent were infected with bovine tuberculosis and 21 per cent with other types of the disease. In adults these figures were, respectively, 1 and 20 per cent. Since 1940, the condition has totally changed. As compared with the incidence of pulmonary tuberculosis, the occurrence of other forms of tuberculosis in childhood during the war years was less frequent. This fact pointed to a decrease in the number of bovine infections. Indeed, determinations of the type of the bacillus isolated in tuberculous children during the periods 1933 to 1939 and 1940 to 1944 showed that in the latter period the percentage of bovine infections among cases of pulmonary tuberculosis fell from 9.6 to 1.8 per cent This decrease in bovine infections in children is probably due to the pasteurization of the milk, which process was introduced to standardize the fat content of the milk.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of Blood, Heart and Blood Vessels and Spleen

PHYSIOLOGICAL STUDIES IN CONGENITAL HEART DISEASE: III. RESULTS OBTAINED IN FIVE CASES OF EISENMENGER'S COMPLEX. R. J. BING, L. D. VANDAM and F. D. GRAY JR., Bull. Johns Hopkins Hosp. **80**:323 (June) 1947.

Five patients with Eisenmenger's complex have been studied.

The performance of the standard exercise test was accompanied in 4 of the 5 patients with a rise in the ratio of oxygen consumed per liter of ventilation. The ratio remained constant in 1 patient. These results are in contrast to those obtained in patients with tetralogy of Fallot, in whom the ratio of oxygen consumed per liter of ventilation usually declines.

In 3 patients, there was a slight preponderance of the intracardiac shunt from left to right. In 2 patients the over-all direction of the intracardiac shunt was toward the left. Irrespective of the over-all direction of the intracardiac shunt, interventricular admixture of blood existed in all patients.

Increased resistance in the pulmonary bed was indicated by the following findings: (*a*) A left to right intracardiac shunt was either small or absent; (*b*) both systolic and diastolic pressures in the pulmonary artery were elevated, and (*c*) the ratio $\frac{\text{velocity energy}}{\text{total work}}$ calculated for the right ventricle was one tenth of the normal, and the work of the right ventricle comprised one third to one half of the total work of the heart.

The relationship of these results to clinical observations was discussed.

FROM THE AUTHORS' SUMMARY.

THE BLALOCK OPERATION FOR CONGENITAL PULMONARY STENOSIS. H. BRODIE STEPHENS, California Med. **67**:160 (Sept.) 1947.

Detailed results are presented on 28 patients who underwent exploratory thoracotomy at the hands of a surgeon who had the intention of performing the Blalock operation if feasible.

The shunt was successfully accomplished in 22 of them. Multiple anomalies made surgical treatment impractical in 5 of the patients.

PRYOR, Redwood City, Calif.

IMMUNOLOGIC STUDIES IN PATIENTS WITH SUBACUTE BACTERIAL ENDOCARDITIS TREATED BY COMBINED PENICILLIN-HEPARIN METHOD: II. REPORT OF SENSITIVITY TO HEPARIN IN PATIENT. MAX GROLNICK and LEO LOEWE, J. Allergy **18**:277 (July) 1947.

A case of induced sensitivity to the drug heparin is reported. Reagins were demonstrated to heparin, to beef serum and to beef lung, which is the source of heparin.

FROM THE AUTHORS' SUMMARY.

THE ANEMIA OF INFECTION: III. THE UPTAKE OF RADIOACTIVE IRON IN IRON-DEFICIENT AND IN PYRIDOXINE-DEFICIENT PIGS BEFORE AND AFTER ACUTE INFLAMMATION. M. M. WINTROBE, G. R. GREENBERG, S. R. HUMPHREYS, HELEN ASHENBRUCKER, WANDA WORTH and RAE KRAMER, J. Clin. Investigation **26**:103 (Jan.) 1947.

The radioactive isotope Fe^{59} was injected intravenously into normal growing and mature pigs and into iron-deficient and pyridoxine-deficient pigs with and without inflammation. Geiger-Müller counts of circulating blood and of isolated hemin showed that the radioactive iron injected appeared in the hemoglobin.

Uptake of radioactive iron was rapid and complete in iron-deficient animals, slow and even negligible if large doses were used in pyridoxine-deficient ones and intermediate between these extremes in normal animals.

The iron uptake in iron-deficient animals with infection was decidedly impaired. In pyridoxine-deficient pigs with infection, the increase of iron uptake which usually follows pyridoxine administration was definitely impaired.

Since pyridoxine deficiency with anemia is accompanied with hyperferremia and since adequate absorption of iron occurs in infection, the authors concluded that the anemia of infection does not result from lack of iron but is caused by impaired hemoglobin production.

BRODSKY, Cincinnati.

ERYTHROBLASTIC ANAEMIA OF COOLEY. K. C. CHAUDHURI, Indian J. Pediat. **14**:75 (April) 1947.

A case of familial erythroblastic (Cooley's) anemia in an Indian girl is discussed. It is the seventh reported case in an Indian child.

McGUIGAN, Evanston, Ill.

SPLENOMEGALY WITH PROFUSE BLEEDING INTO THE GASTROINTESTINAL TRACT. JAKUBCOVA-DERÉROVA, Pediat. listy **2**:141, 1947.

The first patient was a girl 9½ years of age. She died after repeated bleeding from an arroded esophageal varix. The second patient, a boy 2½ years of age, had only one hematemesis of about 500 cc. of blood. Splenectomy was performed. The curve included shows the variation in the blood picture after splenectomy.

FROM THE AUTHOR'S SUMMARY.

HYPERCHROMIC MEGALOCYTIC ANEMIA IN INFANTS. G. M. H. VEENEKLAAS, Nederl. tijdschr. v. geneesk. **91**:316 (Feb. 8) 1947.

Two cases of hyperchromic megalocytic anemia were observed in 1939 and 1942 in children at the age of 1 year, on a diet without fresh vegetables and fruit. Other symptoms were dystrophy, enlargement of liver and spleen, urobilinuria and an increased indirect van den Bergh reaction.

A rise in reticulocytes followed in ten to fourteen days, in 1 patient by the addition of fresh vegetables and fruit to the diet and in the other by the addition of fresh endive only. In six to eight weeks complete recovery resulted.

VAN CREVELD, Amsterdam, Netherlands.

Diseases of Nose, Throat and Ear

THE USE OF STREPTOMYCIN IN THE TREATMENT OF DIFFUSE EXTERNAL OTITIS. BEN H. SENTURIA and R. H. BROH-KAHN, Ann. Otol., Rhin. & Laryng. **56**:81 (March) 1947.

There have been many reports of the occurrence of Pseudomonas (gram-negative motile rods, growing on ordinary nutrient mediums and producing a characteristic water-soluble, chloroform-soluble, greenish pigment). The authors express their opinion that this organism may be the causative agent of diffuse external otitis: It was found in a high percentage of the cases; it was not isolated from normal canals; successful treatment resulted in rapid disappearance of the organism; persistence of the organism was found in cases in which treatment failed to cure and was observed prior to imminent relapse subsequent to cessation of therapy. Treatment was carried on with 250 micrograms, 1 mg. and 5 mg. of streptomycin per gram of carboprop® ointment base (60 parts of carbowax 4000® and 40 parts of propylene glycol). Carboprop® was used alone in a group of controls. The weaker streptomycin ointments were no more effective than the ointment base alone, but the ointment containing 5 mg. of streptomycin per gram of base gave promising and beneficial results. One patient was given 100 mg. of streptomycin parenterally every three hours for three days, for a total of 2.4 Gm. There was little improvement in this patient's condition. MILLER, Philadelphia [ARCH. OTOLARYNG.]

INFECTION OF THE NECK AFTER TONSILLECTOMY. CLIFFORD F. LAKE, Minnesota Med. **30**:851 (Aug.) 1947.

Infection of the neck after tonsillectomy is not a common occurrence but it does take place, and the author warns that after every tonsillectomy it should be watched for. The situation may be represented by cervical adenitis, cellulitis of the neck, infection of a fascial space, thrombophlebitis and septicemia or any combination of these conditions. Some of these infections are dangerous and demand prompt rational treatment. In the paper such treatment is given in detail, and in the conclusion the statement is made that tonsillectomy should not be carried out in the presence of acute infection in the pharynx or mouth.

STOESSER, Minneapolis.

TREATMENT OF STUBBORN OTITIS OF INFANCY BY LOCAL INSTILLATIONS OF PENICILLIN. N. VÉZINA, Union méd. du Canada **75**:1557 (Nov.) 1946.

Otitis media in infancy may become a stubborn chronic condition, resistant to chemotherapy. The author treats such cases by injection of penicillin solution (40,000 units per cubic centimeter) into the middle ear cavity. In a series of 15 cases, cure was effected in 9. Most of the infants received three daily injections, some required only two, while 3 infants received five injections. Six infants who were not cured had only temporary improvement; 2 of them later underwent antrotomy; the parents of 2 refused operation, and 2 were lost to follow-up examination.

DAFFINEE, Melrose, Mass.

TREATMENT OF ACUTE DISEASES OF THE MIDDLE EAR WITH SULFONAMIDE COMPOUNDS. A. RODEL, Pract. oto-rhino-laryng. **8**:499, 1946.

The author presents a series of 5 cases of acute infection of the middle ear in which some of the findings were atypical. The patients had all received various-sized doses of sulfonamide drugs, usually from the onset of the symptoms referable to the middle ear.

Case 1.—The patient complained of otitic pain and received sulfonamide therapy. The pain continued for three weeks without improvement. Otoscopic findings were indefinite. Paracentesis did not produce pus. However, mastoidectomy revealed thrombosis and dehiscence of the wall of the lateral sinus. The patient presented the following atypical findings—normal temperature, absence of chills, four weeks' continual use of sulfonamide compounds and yet at the time of operation well masked sinus thrombosis.

Case 2.—The patient had an acute infection of the upper respiratory tract with pain in the ear and spontaneous perforation. He was immediately given sulfonamide therapy. Two days later severe headaches developed, with elevation of temperature and nuchal rigidity. A lumbar puncture revealed a slight increase of cerebrospinal fluid pressure; otherwise the findings were normal. Mastoidectomy revealed thrombosis of the lateral sinus and of the jugular bulb, with thrombophlebitis involving the internal jugular vein and the facial vein. Three days later thrombosis of a cavernous sinus developed. This patient presented masked sinus thrombosis, which occurred in the first few days of the infection of the middle ear, and, even though sulfonamide therapy was instituted on the first day of the illness, the pathologic involvement progressed to fatal thrombosis of a cavernous sinus.

Case 3.—In this patient severe bilateral pneumonia developed. Sulfonamide therapy was instituted, and the pneumonia gradually subsided. However, a week later there occurred a rise in the temperature and a spontaneous perforation of the left drum membrane. The symptoms continued, and on admission to the hospital the patient had definite evidence of acute mastoiditis. Mastoidectomy revealed thrombosis of the lateral sinus and of the jugular bulb and an epidural abscess of the cerebellum, which was due to type III pneumococcus.

Case 4.—The patient complained of pain in the left ear and of fever. Sulfonamide therapy was begun, and two days later there was a spontaneous perforation of the membrane. Seven weeks later the patient was discharged as cured. However, within three weeks the symptoms recurred, with extreme pain in the ear but without fever. Mastoidectomy revealed thrombosis of the lateral sinus and abscess of the wall of the sinus. This was definitely a case of prolonged mastoiditis masked by the use of sulfonamide drugs, and, even though there was absence of septic temperature and of chills, extensive thrombosis of the lateral sinus was observed.

Case 5.—The patient contracted bronchitis with bilateral otitis media and had an elevated temperature. Three days later there was a bilateral discharge, with slight tenderness over the tip of the mastoid process. Sulfonamide therapy was instituted. The fever subsided, and, although the patient looked toxic, there was no evidence of intracranial complications. However, mastoidectomy revealed thrombosis and abscess of the wall of the lateral sinus.

The 5 cases presented reveal some of the problems that may arise with the intensive use of sulfonamide drugs. There is definite masking of the classic symptoms of any of the complications that may occur.

ABSTRACTER'S NOTE. In consequence, it is important (1) to use massive doses of sulfonamide drugs from the very onset of acute symptoms so that complete

bacteriostatic control of the infection is accomplished; (2) if after a few days of this intensive therapy there is no evidence of complete subsidence of symptoms, to be on guard for the possible masking effect; (3) under such conditions, to do very early an extensive surgical operation to prevent the occurrence of intracranial complications.

PERSKY, Philadelphia [ARCH. OTOLARYNG.]

ROENTGENOLOGIC DIAGNOSIS OF MASTOIDITIS IN INFANTS AND CHILDREN. P. SONNAUER, Paediat. danub. **2**:147 (Aug.-Sept.) 1947.

Three roentgenologic methods are in use in pediatric otology, those of Schüller, Stenvers and Mayer. By their aid it is possible to gather information about the condition of the pneumatic system, the extent of pathologic processes and the site of both the sigmoid sinus and the tegmen. Density of the mastoid cells and destruction of those of the pneumatic system are invariably present with inflammation.

For comparison, bilateral roentgenograms should be made in every instance—every second or third day in acute processes and once a week when the condition is chronic.

In infants, the procedures of Schüller or Mayer are to be used because that of Stenvers presents insurmountable technical difficulties. According to the author's experience, it is possible to gage the density of the antrums in quite young infants, while in those older than 6 months of age even mastoiditis can be seen, as at this age mastoidal cells already show distinct outlines.

FROM THE AUTHOR'S SUMMARY.

Diseases of Lungs, Pleura and Mediastinum

SIMULATED DEXTROCARDIA ASSOCIATED WITH BRONCHIECTASIS: REPORT OF CASE. S. A. LEADER, Am. J. Roentgenol. **56**:743 (Dec.) 1946.

The author presents a case of apparent dextrocardia which was demonstrated to be secondary to atelectatic bronchiectasis and retraction of the lower lobe of the right lung. Emphysema of the middle lobe of the right lung and pleuropericardial adhesions were additional factors contributing to rotation. The roentgenograms and the conditions to be considered in the differential diagnosis are discussed.

HARRISON, Chicago.

PRIMARY BRONCHIAL CARCINOMA AT THE AGE OF 4 YEARS, 4 MONTHS. C. ELAINE FIELD, Brit. M. J. **1**:691 (June 5) 1943.

Previous to this report only 1 case of primary bronchial carcinoma was recorded and this was of a boy 5 years of age. The present patient, a 4½ year old girl, was admitted to the hospital with the classification of emergency, having had an unproductive cough for eleven days and breathless attacks for the past week. She had complaints of abdominal pain, with nausea and vomiting. On her admission the child was pale, with some cyanosis of the lips and nails and severe dyspnea. A right pleural effusion was noted on physical examination, and its presence was confirmed by roentgenogram. Three hundred cubic centimeters of deeply blood-stained fluid was withdrawn, and five further aspirations in the next seven days yielded about 1,700 cc. of similar material. Thoracoscopy revealed the presence of numerous round, smooth, pink nodules of tissue, varying up to 2 cm. in diameter, over the parietal pleura. The results of examination of the fluid from the chest

suggested the presence of a malignant growth. The section of the biopsy specimen from the pleura revealed an infiltrating anaplastic carcinoma.

BIRDSONG, University, Va.

MEDIASTINAL LYMPHOSARCOMA IN A CHILD FOUR MONTHS OF AGE. PER FORSELL, Nord. med. (Finska läk.-sällsk. handl.) **29**:456 (March 1) 1946.

A 4 month old boy displayed breathing difficulties for two weeks before examination. He showed on roentgenograms a tumor in the left mediastinum, with displacement of the heart and the esophagus to the right. The temperature was moderately increased; slight anemia was present with granulocytopenia. There were 4,200 white blood cells and 26 lymphocytes per hundred cells. His condition rapidly deteriorated, with increasing dyspnea and cyanosis. He died a fortnight after his admission to the hospital. At the postmortem examination a lymphosarcoma was seen in the mediastinum, with metastases in the ribs, liver and mediastinal lymph nodes.

WALLGREN, Stockholm, Sweden.

EPIDEMIC OF VIRUS PNEUMONIA IN A SCHOOL. BERTIL SCHERSTÉN, Svenska läk.-tidning. **43**:3057 (Dec. 6) 1946.

At the beginning of the school year in August 1945, one of the pupils displayed cough but attended school. Three weeks later the teacher and 2 pupils were ill with virus pneumonia. All 32 pupils were then examined with cold hemagglutinin tests. Twelve of them reacted positively; 10 had signs of pneumonia; 2 had evident tracheobronchitis without pneumonic signs, and 1 was quite healthy. Six other pupils had bronchitis but reacted negatively to the hemagglutination test. The incubation period seems to be three to four weeks. The prognosis was benign in all cases.

WALLGREN, Stockholm, Sweden.

Diseases of the Gastrointestinal Tract, Liver and Peritoneum

CONGENITAL ABSENCE OF GALLBLADDER. EARL O. LATIMER, F. L. MENDES JR. and W. J. HAGE, Ann. Surg. **126**:229 (Aug.) 1947.

The literature pertaining to congenitally absent gallbladder is reviewed. A preoperative diagnosis of congenital absence of the gallbladder is extremely difficult, if not impossible, to make. There is no group of symptoms or signs which is of value in making a diagnosis. Roentgenographic visualization of the biliary tract is the most accurate diagnostic method known at present. However, when this method fails to produce any shadow whatsoever, congenital absence of the gallbladder is so rare that the condition is not suspected. There is no reported case of the diagnosis being made before operation or postmortem examination.

A total of 71 cases of persons with congenital absence of the gallbladder was reviewed and analyzed; 34 were seen at operation and 38 at autopsy. The average age of all patients reported on was 46 years at the time of discovery. Females were twice as frequent as males in the entire series.

The authors present 3 additional surgical case reports of congenital absence of the gallbladder.

BANTIN, Omaha.

ALLERGIC PAROTITIS. GEORGE L. WALDBOTT and JOHN J. SHEA, J. Allergy **18**:51 (Jan.) 1947.

The authors report 3 cases of recurrent parotitis which in their opinion were the result of sensitivity. Foods were identified with the production of the attacks and elimination produced relief. The parotid swelling preceded attacks of asthma.

These 3 cases were of adults, but the article contains a short review of the literature in which recurrent parotid swellings occurred in children in whom there was a history of allergy.

HOYER, Cincinnati.

EVALUATION OF VAGOTOMY IN CHRONIC NON-SPECIFIC ULCERATIVE COLITIS. CLARENCE DENNIS and FRANK D. EDDY, Proc. Soc. Exper. Biol. & Med. **65**:306 (June) 1947.

Four patients (14 to 57 years of age) with chronic nonspecific ulcerative colitis who had had no previous surgical treatment for the disorder had vagotomy performed. In 2 of the patients results seemed to be excellent. In 1 improvement occurred and in the other the results were equivocal. Another patient had had the colon and part of the small intestine removed previously without results but seemed to be favorably affected temporarily after vagotomy. The authors state their opinion that the results were sufficiently encouraging to warrant further investigation.

HANSEN, Galveston, Texas.

INTESTINAL EPITHELIOMA IN A TEN YEAR OLD GIRL. J-P. BOMBARDIER, Union méd. du Canada **75**:1650 (Dec.) 1946.

A girl 10 years of age gradually became ill over a period of two months, losing weight and growing anemic. Edema of the legs appeared, and a mass was palpated in the upper portion of the abdomen. No digestive symptoms were present.

Operation revealed a tumor mass at the splenic angle of the colon, with metastases to the liver and the nodes about the spleen.

DAFFINEE, Melrose, Mass.

A STANDARDIZED PLAN OF TREATMENT FOR GASTRO-ENTERITIS IN INFANTS. C. ELAINE FIELD, D. MACCARTHY and W. G. WYLLIE, Brit. M. J. **1**:371 (March 27) 1943.

An outbreak of infantile diarrhea at a base hospital resulted in a mortality rate of 80 per cent. After this, certain strict prophylactic measures were taken and a schedule of treatment was formulated. As a result of these factors, the death rate fell to 23 per cent, with no recurrence of the disease in epidemic form. The protective measures used were as follows:

1. Beds were better spaced with interspersion of babies cots with those of older children. The number of children in a ward was reduced to half the number of adults the ward was designed to hold.

2. Masks and gowns were worn by all persons attending any baby under 2 years old.

3. An isolation ward for babies in whom gastroenteritis was developing was obtained, and medical officers were encouraged to send the infants there on the slightest suspicion of the disease.

4. Ventilation was improved in order to keep cool moving air in the wards, and nurses were encouraged to keep the infants warm with hot water bottles rather than to raise the temperature of the ward.

These measures were effective in reducing the incidence rate and in preventing another epidemic; but they are far from ideal, and further recommendations are suggested.

5. Whenever possible, an infant should be treated in its own home unless its condition demands hospitalization. In hospitals the risk of infection is enormous unless the cubicle system is used and nurses trained in prevention of infection are available.

6. When admission is essential, babies under 2 years of age should be nursed in cubicles.

7. If a baby contracts gastroenteritis, it should be kept in its cubicle, and on the baby's discharge the cubicle should receive proper cleansing and preferably remain empty for a day or two.

8. After the war, nurseries for infants under 2 years of age should be discouraged. This particularly applies to nurseries in maternity homes. To overcome this problem, the ideal maternity home could be divided into separate cubicles for mother and child. This seems a justifiable step to take when such figures as those cited by Rice and his co-workers (Epidemic Diarrhea of Newborn; Preliminary Considerations on Outbreaks of Highly Fatal Diarrhea of Undetermined Etiology Among New-Born Babies in Hospital Nurseries, *J. A. M. A.* **109**:475 [Aug. 14] 1937) are considered.

9. If an outbreak develops in an institution, further admission for infants under 2 years old should temporarily cease, as many infants as possible should be sent home and the remainder should be widely separated among older children or adults. Where one room alone has been used for the children, this should be closed, thoroughly cleaned and aired.

The outline of therapy was as follows: Hartmann lactated Ringer's solution was used to which 5 per cent glucose solution was added. This was given intravenously or subcutaneously. If the fluid was given by mouth, the glucose solution was omitted. The quantity of fluid given daily was about 2½ ounces per pound (75 cc. per 0.5 Kg.) of body weight except in those patients who were extremely dehydrated. It is advised that these patients be watched carefully to prevent the occurrence of edema. The chart for milk feeding of these babies does not seem of any great importance. The only important point is to start with small amounts and to increase gradually as the baby tolerates the milk. Patients over 6 months of age were treated with a diet of apple and tea. In those patients who were quite sick blood transfusions were a great help. It is warned that blood should not be given unless dehydration has been previously corrected. Several drugs of the sulfonamide group were given by mouth or intravenously but with unsatisfactory results. Drug therapy on the whole was unsatisfactory. One hundred infants under 2 years of age were treated, and the mortality rate was 23 per cent.

BIRDSONG, University, Va.

INFILTRATION OF THE SPLANCHNIC NERVES AND VOMITING IN INFANTS. M. CAHUZAC, ARMENGAU and R. BILLIÈRES, Pédiatrie **36**:117 (March-April) 1947.

Cases of vomiting in children are divided into those of a secondary nature, which do not lend themselves to the treatment of splanchnic infiltration, those of mechanical obstruction and those of "habitual nature." These last two groups were investigated by the authors by means of analyzing all cases of persistent vomiting.

In the mechanical group the patients with pyloric stenosis did not respond to infiltration, but temporary relief permitted hydration and operation at a more favorable time. Residual postoperative vomiting was suppressed, permitting faster recovery. Duodenal obstruction, because of its organic character, did not respond

to this treatment. Megacolon of a functional nature showed definite improvement after infiltration of the splanchnic and lumbar sympathetic nerves. True congenital megacolon (Hirschsprung's disease) responded favorably for a while only, thus permitting the postponement of the operation to a more opportune time.

In the second group, differentiation must be made between cases of aerophagy or milk sensitivity, in which the treatment of splanchnic infiltration would be unnecessary, and those of "neurovegetative dysharmony," in which infiltration is the therapy of choice. In large atonic stomachs the results are excellent after two to eight infiltrations. The small spastic stomachs respond too, but with less certainty.

In general, it can be said that when dietary and medicinal treatment fails, splanchnic infiltration should be tried. In well chosen cases it may be the most effective treatment; in others, only an aid to other procedures. Its limits should be recognized to avoid irrational application and failure. GLASER, Chicago.

PRIMARY ENTEROGENIC TUBERCULOUS PERITONITIS. OLGA FRÜHBAUEROVÀ and JAN RINGL, Pediat. listy **2**:154, 1947.

Two cases of primary enterogenic tuberculous peritonitis in infants are reported. In both the tuberculin test was positive only in the final phase of the illness. The sedimentation rate of the red cells was low.

FROM THE AUTHORS' SUMMARY.

HEMANGIOENDOTHELIOMA OF THE LIVER IN AN INFANT 25 DAYS OF AGE. B. MUSSA, Policlinico inf. **15**:309 (July) 1947.

The author reports a case of hemangioendothelioma of the liver in a girl 25 days of age, with an anatomicohistologic description.

FROM THE AUTHOR'S SUMMARY.

FOLIC ACID TREATMENT OF CELIACA. LARS SÖDERHJELM, Svenska läk.-tidning. **43**:3000 (Nov. 29) 1946.

This report is on 2 cases of celiaca in children treated with folic acid, with good effect on the digestive symptoms but with no effect on the hypochromic anemia. The treatment lasted five weeks, and the amount given was 10 mg. daily. The children were 1½ and 2 years old. WALLGREN, Stockholm, Sweden.

Nervous Diseases

FAMILIAL HYPOPLASIA OF THE BRAIN. N. G. PERSSON, Nord. med. (Hygiea) **29**:244 (Feb. 1) 1946.

Cystic degeneration of the brain in a girl 6 months of age is reported. She was first seen three months previously, when she had displayed convulsions. Delivery was normal and the circumference of the skull was not unusual. At 6 months of age, the skull was somewhat enlarged; the encephalogram showed that the greater part of the brain was transformed into a cystic mass. There was hypoplasia of the optic nerve. The light reaction was normal, and the infant reacted to sounds. A brother had died on the twelfth day of life with pathologic changes of the brain similar to those demonstrated in this child. A sister was born prematurely and showed oligophrenia. A brother was an imbecile and had moderate internal hydrocephalus. Another brother was healthy and well developed.

The mother was psychically deficient; the father was healthy. The author expresses his belief that these disorders are due to a cerebral vascular hypoplasia that eventually produces anoxemia, with cystic degeneration and resorption of the necrotic masses.

WALLGREN, Stockholm, Sweden.

AN EPIDEMIC OF ACUTE BENIGN MENINGITIS. KURT PALMÉN and KUNO QUARNÅ, Svenska läk.-tidning. **43**:278 (Feb. 1) 1946.

In the space of one month (September-October 1945) 36 children with acute meningitis were admitted to the hospitals in Norrköping, Sweden. The disease manifested itself with fever, headache, vomiting and, in some children, pronounced stiffness of the neck. The spinal fluid contained 15 to 77 cells, mostly polymorphonuclears, but showed no, or only slight, increase in protein. The fluid was sterile, and inoculation of laboratory animals gave negative results. In all the children the course was benign with no paresis. At the time of the epidemic only 1 case of poliomyelitis occurred in the town. In about 50 per cent of the patients a direct contact was demonstrable. Among the sick were 2 pairs of siblings, 3 children belonging to the same day nursery and 6 who lived in the same house. In a family of 11 persons, 10 were sick with typical signs. There were many persons with abortive attacks in the neighborhood of those with the typical cases.

WALLGREN, Stockholm, Sweden.

GUILLAIN-BARRÉ SYNDROME IN CHILDREN. GUSTAF LINDBERG, Svenska läk.-tidning. **43**:2930 (Nov. 22) 1946.

This is a report of 2 cases. The first was of a 4½ year old boy. One month after he was treated for tonsillitis with a sulfonamide compound, he became ill with symmetric paresis of the legs and arms, pronounced impairment of the sensory nerves and paralysis of the sphincter muscles. The signs and symptoms progressed for one month, began to ameliorate after an additional two weeks and had disappeared after three and a half months. In the spinal fluid there was a decided increase of the protein, with 1 to 2 cells per cubic millimeter.

The second case was of a girl 3 years of age who became ill with symmetric paralysis of the legs and arms, pronounced increase of the protein content of the spinal fluid and a maximum cell count of 6 to 7 per cubic millimeter. The signs progressed for one week; then a regression set in, and the child was well after two months. In neither child was there fever.

WALLGREN, Stockholm, Sweden.

TREATMENT OF PNEUMOCOCCIC MENINGITIS WITH COMBINED PENICILLIN AND SULFONAMIDE THERAPY. A. VAN DER SAR, Nederl. tijdschr. v. geneesk. **90**:572 (June 1) 1946.

Cure of pneumococcic meningitis in 2 babies is reported, with a discussion on the method of treatment.

VAN CREVELD, Amsterdam, Netherlands.

Psychology and Psychiatry

GREAT PSYCHOLOGICAL EFFECTS OF A MINOR SPEECH DEFECT. ALFREDO DUB, J. Speech & Hearing Disorders **13**:251 (Sept.) 1948.

A review is presented of a minor articulatory defect showing its tremendously significant effects on the person. The patient recently reported that for the first time he feels he is a member of human society.

PALMER, Wichita, Kan.

ENVIRONMENTAL FACTORS IN RELATION TO THE SPEECH OF CEREBRAL PALSIED CHILDREN. PHILIP N. HOOD, KENNON H. SHANK and DORIS B. WILLIAMSON, J. Speech & Hearing Disorders **13**:325 (Dec.) 1948.

A study was made of the speech adequacy of cerebral palsied children in its relationship to certain aspects of the parental environment. Forty-one families were drawn at random from the poorest to the wealthiest residential districts in Denver. The cerebral palsied children, 24 boys and 17 girls, had an age range of 2 years 6 months to 23 years. The California Test of Personality, Adult Series, the A-S Reaction Study of Allport and Allport, the C-R Opinionaire, the Mental Health Analysis, Adult Series, and the Murray Thematic Apperception Test were given. Results of the studies seemed to indicate that certain aspects of the parental situation concerning the neurotic environment of the cerebral palsied child and similar items are important in relation to the speech status of cerebral palsied children. Among other observations, the authors state that there is a correlation of 0.305 $\pm$0.142 between general muscular involvement and speech adequacy, while there is a correlation of 0.858 $\pm$0.041 when the involvement of the speech muscles is compared with speech adequacy, indicating that better speech is related more closely to the actual involvement of the speech muscles than to the general involvement with cerebral palsy.

PALMER, Wichita, Kan.

A STUDY OF CERTAIN FACTORS PRESUMED TO BE ASSOCIATED WITH READING AND SPEECH DIFFICULTIES. A. STERL ARTLEY, J. Speech & Hearing Disorders **13**:351 (Dec.) 1948.

The following conclusions were reached in a review of the literature relating to speech and reading difficulties:

1. There appears to be a relationship between speech difficulties and deficiencies in reading ability, although there is absence of agreement concerning the extent.

2. There are some indications that this relationship exists even when reading ability is appraised by silent reading tests.

3. Counterbalancing factors tend to reduce or increase the potency of any factor that is being appraised for its relationship to either speech or reading defects.

4. Studies indicate that speech defects may be the cause of reading defects, the result of reading defects or the two may exist side by side.

5. Explanations for the speech defects as the cause of reading difficulties may be the concern of the speaker over his defective speech, the interference with his rate of reading, errors of pronunciation or dislike. While factors such as reduced auditory acuity, lack of auditory discrimination and relatively short auditory memory span may be related to reading retardation, they do not appear to be significantly related to speech defects.

PALMER, Wichita, Kan.

THE RELIABILITY AND VALIDITY OF MONITORED CONNECTED DISCOURSE AS A TEST OF THE THRESHOLD OF INTELLIGIBILITY. GEORGE A. FALCONER, J. Speech & Hearing Disorders **13**:369 (Dec.) 1948.

A study was made of the reliability with which normally hearing and hard of hearing persons can select a threshold of intelligibility for connected discourse. A preliminary study was made on 6 normal and 41 hard of hearing subjects to determine that learning did not affect the experiment. For the main experiment, 25 normal and 47 hard of hearing subjects were chosen at the hearing clinic at an institute for the deaf. These represented 50 normal ears and 94 hard of hearing ears. A calibrated earphone was placed on the subject's right ear; auditory test

no. 9 was used to determine his threshold for speech, and the subject was allowed three trials to select the lowest intensity level at which he could hear and understand everything said by the speaker. The no. 9 list of 42 spondees was varied from test to test, but the same recording of connected discourse was used. The advantages claimed for this procedure are speed, interest for the listener, high validity, satisfactory reliability and negligible learning effects. The test is subjective and an occasional subject gives an erratic threshold.

PALMER, Wichita, Kan.

PLAY DIAGNOSIS. ERNEST HARMS, Nerv. Child **7**:233 (July) 1948.

This paper develops the thesis that play is the language of childhood. Greater diagnostic and therapeutic values will be gained through the use of this indigenous behavior of children than by the attempt to adopt psychopathologic concepts of adults to children. Many controversial academic and practical problems of play diagnosis are discussed.

WEINFELD, Highland Park, Ill.

PLAY THERAPY. J. LOUISE DESPERT, Nerv. Child **7**:287 (July) 1948.

This paper is well worth reading in its entirety. The material is well organized and clearly presented without the verbal redundancy of many of the articles in the same issue on the same subject. The dynamics and practical application of play therapy are discussed. The problems of preparing the child for psychiatric referral and of introducing him to the therapeutic situation are discussed in simple and clear terms.

WEINFELD, Highland Park, Ill.

SOMATIC SUBSTITUTIVE REACTIONS IN ADOLESCENTS. ROBERT E. HARMS, New Orleans M. & S. J. **101**:260 (Dec.) 1948.

The frequency of somatic substitutive reactions and the dangers of failure to recognize these reactions are stressed. Several illustrative cases are discussed. The difficulties involved are indicated by the fact that, after an organ has responded a number of times to an unpleasant mental experience, specific physical expression can occur without the corresponding mental experience which originally initiated it.

MCGUIGAN, Evanston, Ill.

CHILDHOOD BEHAVIOR SEQUELAE OF ASPHYXIA IN INFANCY—WITH SPECIAL REFERENCE TO PERTUSSIS AND ASPHYXIA NEONATORUM. GEORGE B. ROSENFELD and CHARLES BRADLEY, Pediatrics **2**:74 (July) 1948.

On the basis of an analysis of the records of 673 children referred for inpatient psychiatric treatment, the majority of those having a history of whooping cough in infancy or of asphyxia neonatorum showed a characteristic behavior syndrome. The behavior syndrome consisted of the six following traits: unpredictable variability in mood, hypermotility, impulsiveness, short attention span, fluctuant ability to recall material previously learned and conspicuous difficulty with arithmetic in school. Each of these behavior traits occurred from once and a half to twice as frequently in patients with a history of asphyxia in infancy as in a control group.

The syndrome, consisting of at least five of the six traits, occurred more than eight times as frequently in the patients with a history of asphyxia as in a control group. The syndrome occurred significantly more frequently in children with a history of whooping cough, when the illness occurred in the first three years of life rather than later. Since this behavior syndrome presents a serious handicap

to successful social adjustment in later childhood, strenuous therapeutic efforts should be made toward eliminating asphyxia as a complication of illness in infancy.

FROM THE AUTHORS' SUMMARY.

Diseases of the Genitourinary Tract

CLINICAL FORMS OF ENURESIS. R. LACASSIE, Presse méd. **54**:771 (Nov. 16) 1946.

Enuresis is so easy to diagnose that most authors consider only the therapy or pathogenesis of this remarkable condition. Lacassie discusses the evolution of enuresis from early infancy. Nocturnal polyuria can be detected in the young infant and is the forerunner of involuntary nocturnal micturition in the older child.

DAFFINEE, Melrose, Mass.

EMBRYONAL CARCINOSARCOMA OF THE KIDNEY (WILMS'S TUMORS). EDMUNDO CALVA CUADRILLA and JESÚS LOZOYA S., Bol. méd. d. hosp. inf. Mexico **4**:265 (May-June) 1947.

Ten cases of embryonal carcinosarcoma of the kidney (Wilms's tumors) diagnosed and treated at the Hospital del Niño, of México, D. F., from July 1943 to July 1946, are published. The importance of this disease is noted. A definition of this group of tumors and the rules that should determine the nomenclature are given, as well as an attempted classification of renal tumors in children.

The theories concerning histogenesis are summarized, and Dean and Pack's conception is accepted as the most adequate. The clinical characteristics of the disease are described, and the order that must be followed for its study is analyzed. A sketch to assist in the differential diagnosis of the abdominal tumors in children is included. The great mortality and the necessity for an early diagnosis are noted.

Surgical and roentgenologic treatments are presented and discussed, with the recommendation, as a general rule, of immediate surgical treatment followed by radium therapy. Comments on the 10 cases studied are made. A general and special bibliography on this work is also presented.

FROM THE AUTHORS' SUMMARY.

Diseases of the Muscles, Bones, Joints and Lymph Glands

PALINDROMIC RHEUMATISM. ALEC WINGFIELD, Brit. M. J. **2**:157 (Aug. 4) 1945.

This single case is classified as the syndrome of palindromic rheumatism. The patient had painful swollen joints and disability, lasting one to two days at the most. He then had prompt release from all symptoms. He was hospitalized for months, with recurrence of these attacks in various joints of his body. He had thorough laboratory studies and repeated physical examinations. No abnormalities were found other than an elevated sedimentation rate during the one to two days he was sick. No medicaments gave relief in this condition. He was discharged unimproved from the hospital.

BIRDSONG, University, Va.

CONGENITAL AND INFANTILE AMYOTONIA. SVEN BRANDT, Nord. med. **29**:665 (March 29) 1946.

The author reports 2 cases of muscle paralysis which was most pronounced in the lower extremities. The condition was demonstrated from birth on and showed an amelioration. The author discusses the term amyotonia congenita and maintains

that it should be reserved as designating a purely clinical group of signs for (1) Hoffmann-Werdnig disease, (2) congenital forms of progressive muscular dystrophy and (3) genuine Oppenheim's disease with good prognosis. In the author's opinion, the 2 cases reported belong in the last category.

WALLGREN, Stockholm, Sweden.

GENETICS OF OSTEOCHONDRODYSTROPHY. HANS F. HELWEG-LARSEN and ERNST TRIER MÖRCH, Nord. med. (Hospitalstid.) **30**:877 (April 18) 1946.

This is a clinical and genetic study of three families with Morquio's syndrome and one family with Silverskiöld's syndrome. In addition, the authors made a genetic review of 21 families with osteochondrodystrophy who were reported on in the medical literature. It is maintained that the two types of this lesion must be separated from one another: (1) Morquio's syndrome, which is inherited recessively and in which the osseous changes are localized especially to the vertebral column, and (2) Silverskiöld's syndrome, which is transmitted simply as a dominant character and in which the skeletal changes are localized principally to the extremities.

WALLGREN, Stockholm, Sweden.

Miscellaneous

NITROGEN MUSTARDS IN THE TREATMENT OF NEOPLASTIC DISEASE: OFFICIAL STATEMENT. CORNELIUS P. RHOADS, J. A. M. A. **131**:656 (June 22) 1946.

This is a preliminary report on the use of nitrogen mustards, *tris* (beta-chloroethyl)amine hydrochloride and methyl-*bis* (beta-chloroethyl)amine hydrochloride, in the treatment of neoplastic disease. A total of 160 patients have been treated, chiefly for lymphoma, leukemia and allied conditions. The methyl-*bis* compound seems preferable as it gives less reaction at the site of injection. The dosage for one course of treatment is 0.1 mg. per kilogram of body weight given intravenously on four successive days. The predominant toxic effect, and, therefore, the limiting factor in treatment, is damage to normal hematopoietic function. This damage may exceed the beneficial effect on the tumor. The treatment is not a cure but does give temporary remissions similar to those produced by radiation therapy.

BAIRD, Wauwatosa, Wis.

NITROGEN MUSTARD THERAPY: USE OF METHYL-BIS (BETA-CHLOROETHYL)-AMINE HYDROCHLORIDE AND TRIS (BETA-CHLOROETHYL)AMINE HYDROCHLORIDE FOR HODGKIN'S DISEASE, LYMPHOSARCOMA, LEUKEMIA AND CERTAIN ALLIED AND MISCELLANEOUS DISORDERS. LOUIS S. GOODMAN, MAXWELL M. WINTROBE, WILLIAM DAMESHEK, MORTON S. GOODMAN, ALFRED GILMAN and MARGARET T. MCLENNAN, J. A. M. A. **132**:126 (Sept. 21) 1946.

This is a report of 67 cases treated with the nitrogen mustards. The dosage used was 0.1 mg. per kilogram of body weight, given intravenously daily or every other day for three to six doses. A freshly prepared solution in sterile aqueous sodium chloride solution was used, and great care was taken not to get extravasation into tissues or to let the solution touch the skin or mucous membranes. These substances do not cure but do deserve further clinical trial in treatment of Hodgkin's disease, lymphosarcoma and chronic leukemia. Dramatic, but temporary, results were sometimes obtained, and remissions of weeks or

months were procured in apparently terminal and radiation-resistant cases. There is a small margin of safety in the use of these compounds, and the optimum dosage for treatment has yet to be determined.

BAIRD, Wauwatosa, Wis.

NITROGEN MUSTARD THERAPY: STUDIES ON THE EFFECT OF METHYL-BIS (BETA-CHLOROETHYL)AMINE HYDROCHLORIDE ON NEOPLASTIC DISEASES AND ALLIED DISORDERS OF THE HEMOPOIETIC SYSTEM. LEON O. JACOBSON, CHARLES L. SPURR, E. S. GUZMAN BARRON, TAYLOR SMITH, CLARENCE LUSHBAUGH and GEORGE DICK, J. A. M. A. **132**:263 (Oct. 5) 1946.

The report covers a series of 59 patients with neoplastic and allied diseases of the hemopoietic system treated with nitrogen mustards. The diseases included: Hodgkin's disease, lymphosarcoma, sympathoblastoma, multiple myeloma, myelogenous leukemia (acute and chronic forms), polycythemia rubra and lymphatic leukemia (acute and chronic forms). The dosage of the drug used was 0.1 mg. per kilogram of body weight given in courses of from one to seven daily injections. Encouraging results were largely confined to Hodgkin's disease.

BAIRD, Wauwatosa, Wis.

TOXIC REACTIONS ACCOMPANYING PENICILLIN THERAPY. W. J. MORGINSON, J. A. M. A. **132**:915 (Dec. 14) 1946.

Reactions to penicillin are classified as due to its action as (1) a direct toxin and primary irritant, especially important in intrathecal administration, (2) an antigen, which includes immediate and delayed reactions with the principal shock tissue, the epidermis, the dermis or, usually, the vascular system, (3) a therapeutic shock excitant, occurring in the treatment of syphilis, and (4) an indirect influence on pathologic processes.

BAIRD, Wauwatosa, Wis.

PENICILLIN IN PEDIATRICS. PAUL VON KISS, Ann. Pædiat. **168**:65 (Feb.) 1947.

I should like to summarize my experience with penicillin up till now. Of 86 children who would have died, 50 survived and 36 died. Autopsies showed that the deaths were caused by severe anatomic changes in the liver and heart. There can be no doubt that the penicillin on hand was inadequate in amount for these patients' requirements, which explains the results. I was, therefore, forced to use the drug only as a last resort in late and desperate cases. But if penicillin is available without restriction, the mortality in this group can be greatly reduced.

FROM THE AUTHOR'S SUMMARY.

THE REACTION OF CHILDREN TO AUTONOMIC DRUGS. HANS MAUTNER, Ann. pædiat. **169**:74 (July) 1947.

The preponderance of the parasympathetic over the sympathetic system in the infant is demonstrated by various examples. It is shown that infantile tachycardia only appears to be contradictory to this preponderant vagotonus.

As the autonomous nervous system is less well developed in the infant than in the adult, it is understandable that drugs which act on this system do so in a different way and are borne differently by the infantile organism.

FROM THE AUTHOR'S ABSTRACT.

Book Reviews

Tuberculosis in Childhood. Second Edition, revised by Henry F. Macauley. By Dorothy Stopford Price, M.D. Price, $7. Pp. 228, with 54 illustrations. Baltimore: The Williams & Wilkins Company, 1948.

This is a small book of the pocket type. It is packed with a tremendous amount of statistics and information on tuberculosis in childhood as found in Ireland.

The clinical picture, with symptoms, physical findings, roentgenograms and results of laboratory tests, is closely correlated with an evaluation of the pathologic changes seen on postmortem demonstrations.

The classification used is simple and complete: type I, primary tuberculosis, type II, dissemination by the blood stream and type III, bronchogenic tuberculosis.

Tuberculosis in children in Ireland still has a high incidence of the bovine type. The control of tuberculosis in cattle is, therefore, a desired measure. Erythema nodosum is a type of tuberculosis rather common there but seldom seen in this country. Tuberculin skin testing is discussed thoroughly, and great emphasis is placed on its importance in an early diagnosis. "The first stages of tuberculosis cannot be recognized by the stethoscope alone."

The subject of roentgenology is handled from a clinician's point of view, and many phases of this work are illustrated with excellent reproductions of films. Examinations of gastric washings are stressed, but in the reviewer's opinion, bronchoscopic aspirations provide far more reliable and accurate information.

The treatment of the problem of tuberculosis in the adolescent is an important contribution to the subject, and the outstanding factors are listed which make this age period so dangerous.

The treatment for all tuberculosis is summed up in the one word "rest." Pneumothorax is given its proper evaluation, but thoracic surgery is left with little comment. BCG is discussed with a good deal of approval, and some important questions are answered, such as cases which are suitable, what the duration of immunity is and which method of using the material is best. The use of streptomycin is mentioned only as an additional hope for persons with tuberculous meningitis.

Extrapulmonary tuberculosis of the eye, cutaneous conditions, tuberculosis of the cervical glands, and abdominal and renal tuberculosis are discussed with a great deal of clinical judgment and conservatism. A chapter on bone and joint tuberculosis was written in conjunction with H. F. Macauley. This is a good clinical treatise. The treatment of this type of tuberculosis will be greatly changed when the use of streptomycin is considered.

The book is well written, and the subject matter is treated thoroughly and completely. Having this problem of childhood compiled in such a compact form fills a long-standing need.

Education for Professional Responsibility. Report of the proceedings of the Inter-Professions Conference on Education for Professional Responsibility, Buck Hill Falls, Pa., April 12 to 14, 1948. Price, $3. Pp. 207, with no illustrations. New Brunswick, N. J.: Rutgers University Press, 1948.

One defect which has been charged against the present day scheme of medical education, in spite of its efficiency in imparting purely scientific knowledge, is the fact that the young man in medical school learns nothing at all about the art

of practice. The ability to deal with people, to gain their confidence, to be able to influence them to do that which is in his mind the wisest, this he must acquire by trial and error. The same qualities, assuming an adequate technical knowledge, aid in the acquisition of a clientele as help the young man in business become an executive and rise to the higher levels of management.

This little book is a record of a meeting held in April 1948 and participated in by medical teachers and teachers in schools of law, divinity, engineering and business. The points of view of all these educators are set forth and make interesting reading for anyone who concerns himself with the relationship, other than the purely technical, of the professions with society. It is brought out that the young cleric who has not succeeded in freeing himself from the maternal leading strings can scarcely be a strong counselor and guide to those of his flock who need moral, mental or spiritual support. The lawyer must have a wide acquaintance with humanity to render the greatest service to his own clients and to society as a whole. The physician, who sees men and women when they are most in need of physical help, will serve better if he is equipped with some understanding of mankind, as well as an adequate stock of medical science.

In a brief review, the varying points of view of all the participants in the discussion cannot be brought out. The little book covers a ground which has been traversed by relatively few members of the professions. There is much in it which should be of value to the physician and, perhaps, particularly to the pediatrician who, in addition to the infant, and its bodily ills, often has an extremely anxious and mentally disturbed mother with whom to deal.

Development of the Basic Rorschach Score with Manual of Directions. By Charlotte Bühler, Karl Bühler and D. Welty Lefever. No price given. Pp. 190, with 53 charts. Los Angeles: Rorschach Standardization Study, 1948.

The Rorschach test has established itself as a practical device for the evaluation of personality structure. As a result, it has become one of the essential tests in the extensive armamentarium of the clinical psychologist.

In this test the subject is asked to interpret ten ink blots. The ten ink blots are standard and were first used by the brilliant Swiss psychiatrist, Rorschach. Rorschach formulated a discipline for the interpretation of a person's responses to the ten ink blots. Psychiatrists and psychologists who have used the test clinically have generally confirmed Rorschach's original interpretation. At the same time, there have been many experimental attempts to validate the Rorschach test as an instrument for the assay of personality. In addition, psychologists have tried to determine the extent to which it can be standardized and quantified. This is the aim of the monograph now being reviewed. The reported investigation demonstrates that the Rorschach test is an effective measure of personality integration or disintegration. The authors employ a comprehensive list of diagnostic signs to obtain a basic Rorschach score. This score represents the person's level of integration and adjustment, or his capacity to meet reality and master situations of conflict.

This study presumes a thoroughgoing acquaintance with the Rorschach test and the Klopfer scoring system. As such, the monograph is of little interest or practical value to the average pediatrician and psychiatrist. Its chief appeal should be to the psychologic and medical practitioner who already has extensive experience with the Rorschach test and to those engaged in the experimental investigation of personality.

The Rh Blood Groups and Their Clinical Effects. By P. L. Mollison, A. E. Mourant and R. R. Race. Medical Research Council Memorandum No. 19. Price 1s, 6d. Pp. 75, with 3 illustrations and 12 tables. London: His Majesty's Stationery Office, 1948.

The first part of this book, written by Dr. Race, deals with Rh groups. He explains the division of Rh-positive and Rh-negative groups and gives the English nomenclature for reference to the genotype Rh positive as DD or Dd and Rh negative as dd. Tables are given showing the Rh genotypes of English persons and the various Rh antibodies. The chapter is concluded with Fisher's genetic basis for the allelomorphic antigens.

In the second chapter, Dr. Mollison writes of the clinical considerations, explaining the ways in which isoimmunization to the Rh factor occurs. In hemolytic disease of the newborn, the differential diagnosis, morbid anatomy and treatment of the condition are fully described. He concludes with instances of isoimmunization in which antigens other than Rh are concerned.

The final chapter, by Dr. Mourant, is on Rh testing. It contains a full and detailed description of the various methods of testing for Rh antibodies, of typing cells and of detection of sensitization of red cells, as well as specialized Rh tests and technics. This last chapter is of especial interest to those who wish details of the technics for performing these necessary examinations.

This is an excellent monograph and should be in the hands of all who desire an informative and concise account of the Rh problem to date. Pediatricians have been looking forward to such a study by these well known authors, and the result is well worthy of their effort.

Traitement moderne des méningites purulentes aigues. By René Martin and Bernard Sureau. Price, 450 francs. Pp. 256, with 40 figures and 25 charts. Collection de L'Institut Pasteur. Paris, France: Editions Médicales Flammarion, 1948.

The authors divided this book into two parts. In the first chapter there is a historical review of meningitis, including the progress made in treatment from the time antimeningococcus serum was developed in 1906, up to the present. The remainder of part I is devoted to the treatment of the commoner forms of bacterial meningitis with the exception of the tuberculous form. As might be expected, particular attention is given to the meningococcus, although the pneumococcus is classed as a close contender in importance. Then follow, in order, chapters on the streptococcus, staphylococcus and Pfeiffer's bacillus (Hemophilus influenzae). The last two chapters in part I apply to rare forms of purulent meningitis.

Part II concerns various phases of treatment, including choice of remedies, dosages and methods of administration. Intrathecal therapy is classed as a necessity when penicillin or streptomycin is indicated. Notwithstanding the latter opinion, ill effects and serious accidents are cited as having followed the intraspinal injection of antibiotic substances.

There is little, if anything, new in this book which, for the most part, constitutes a review of cases of meningitis reported by various investigators. The authors' personal experiences are also referred to. However, one is likely to gain the impression that American and English writers have exerted a strong influence in formulating their opinions. Nevertheless, it is refreshing to find that penicillin is not considered a valuable drug in the treatment of the ordinary form of meningococcic meningitis. Great stress is placed properly on the sulfonamide drugs for the foundation of meningitis therapy. The authors make many refer-

ences to investigators in this country and agree with those they cite, in no uncertain terms, that penicillin and streptomycin must be injected intrathecally when used for meningitis. The book would be much more modern if it pointed out the fallacies of intrathecal therapy.

There are many tables, numerous graphs and several plates, these last relating to laboratory procedures, which are interesting. At the close is a valuable bibliography of twenty pages. The print and paper are good, and the material is not difficult to read.

Hematology. By Cyrus C. Sturgis. Price, $12.50. Pp. 915, with 93 illustrations and 3 plates. Springfield, Ill.: Charles C Thomas, Publisher, 1948.

The author has given in this new text on hematology an unprecedented coverage of the pertinent literature. The book appears to be a complete source of knowledge for the practitioner and student in this field. The clear and concise presentation of the subject matter should stimulate the reader to greater interest in the study and diagnosis of blood diseases.

Further reference than this book will be required for the trained hematologist, especially as regards morphologic detail in the various types of cells.

This book represents a distinct contribution to medical literature and should be in the reference library of all physicians. It appears to be the best American text in its field.

Introduccion al estudio de la pediatría y puericultura (concepto, evolución historica, método). By Manuel Suárez. No price given. Pp. 106, with 5 photographs. Zaragoza, Spain: "La Académica" (*Revista Española de Pediatria*), 1949.

This interesting little book is published by the *Revista Española de Pediatria* and is intended to give the prospective student or practitioner who wishes to specialize in pediatrics a general idea of the subject. This volume includes a history of pediatrics in Europe and the Americas, a review of the general scope of the subject, the reasons for a separate specialty and the methods of teaching it, with advice to the student.

Although written in Spanish, it is readable and would be invaluable for anyone wishing to study abroad, particularly in Spain, as well as of considerable historical interest. The photographs are of prominent children's hospitals and pediatricians.

INDEX TO VOLUME 78

The asterisk (*) preceding the page number indicates an original article. Subject entries are made for all articles. Author entries are made for original articles and society transactions. Book Reviews, Obituaries and Society Transactions are indexed under the letters B, O and S, respectively.

Abdomen: See also Gastrointestinal Tract; Pelvis; Peritoneum
time of election for abdominal surgery in childhood, 803
Abnormalities and Deformities: See also Hypertrophy; Monsters; Twins; and under names of organs and regions, as Foot; Forearm; Gallbladder; Genitals; Heart; Jaws; Muscles; Skin; Tongue; etc.
congenital anomalies following maternal rubella, *334
rubella as cause of congenital malformations, *914
Abramson, H.: Acute respiratory disorders among newborn infants in obstetric nurseries; experience in New York city, 1940 to 1948, *883
Abscess: See also under names of organs and regions, as Brain
Perinephritic: See Perinephritis
sterile, in both buttocks secondary to injection of penicillin in sesame oil, *387
tuberculous, formation following penicillin therapy, 789
Abt, A. F.: Aplastic anemias in childhood; report of primary idiopathic refractory type, with splenectomy, in 11 year old girl, *516
Acetic Acid: See Tinea capitis
Acetylcholine: See Choline and Choline Derivatives
Acetylsalicylic Acid: See Salicyl Compounds
Acid, Acetic: See Tinea capitis
Acetylsalicylic: See Salicyl Compounds
Amino: See Amino Acids
Ascorbic: See Ascorbic Acid
Cevitamic: See Ascorbic Acid
Folic: See Folic Acid
Nicotinic: See Nicotinic Acid
Para-Aminobenzoic: See Rheumatic Fever
Para-Aminosalicylic: See Salicyl Compounds
phenylpyruvic oligophrenia; 2 cases of siblings, *759
Pteroylglutamic: See Folic Acid
pyruvic; significance of blood pyruvic acid level in infancy; further observations, 924
Salicylic: See Salicyl Compounds
succinic; accelerated production of poliomyelitis, *1
Acid-Base Equilibrium: See also Hydrogen Ion Concentration
acute acetylsalicylic acid intoxication; report of 5 cases with 2 deaths, *477
Acrocephaly; oxycephaly, 782
Acrodynia; effects of autoxidation on antiacrodynic potency of fats and linoleic esters, 775
Adams-Stokes Disease: See Heart, block
Addison's Disease; adrenal cortical hypofunction (Addison's disease) in chronic malaria, 124
and nonspecific Addison syndrome in children, 616
Adenohypophysis: See Pituitary Body
Adipose Tissue: See Fat
Adiposogenital Syndrome: See Laurence-Moon-Biedl Syndrome
Adolescence; age variation of predisposition to tuberculosis, 941
Adolescence—Continued
ascorbic acid metabolism of adolescent children, 449
Precocious: See Puberty
somatic substitutive reactions in adolescents, 953
Adrenalectomy: See under Adrenals
Adrenogenital Syndrome: See Puberty, precocious
Adrenals; acute insufficiency in infancy, 292
cervical adenitis in infants vaccinated at birth with BCG, 125
Cushing's syndrome due to tumor of adrenal cortex; report of case of 11 month old infant, with apparent operative cure, *260
distribution of Feulgen and 2,4-dinitrophenylhydrazine reactions in normal, castrated, adrenalectomized and hormonally treated rats, 799
pituitary-adrenal cortical control of lymphocyte structure and function as revealed by experimental x-radiation, 798
Aerosols: See Penicillin
Africans: See Negroes
Age, postnatal; influence on kidney function of premature infants, 782
trends in age distribution of childhood diseases, 623
variation of predisposition to tuberculosis, 941
Agglutinins and Agglutination: See also Antigens and Antibodies; Blood, groups; Immunity; Rheumatic Fever; etc.
agglutinating substances for homologous coliform organisms; observations on their occurrence in serum and feces of infants, *717
cold agglutinins in normal children, 126
Air, Alveolar: See Respiration
laboratory infection with psittacosis virus treated with penicillin and sulfadiazine and experimental data bearing on mode of infection, 288
Air Passages: See Respiratory Tract
Alarcón, A. G.: Rubella as cause of congenital malformations, *914
Albumin: See also Blood, proteins; Proteins
comparative nutritive value of casein and lactalbumin for man, 282
Alimentary Tract: See Digestive System
Intoxication: See Toxemia
Alkalosis: See Acid-Base Equilibrium
Allen, T. C.: Further studies on use of streptomycin in treatment of whooping cough, *212
Allergy: See Anaphylaxis and Allergy; Asthma; etc.
Alloxan; effect of pregnancy complicated by alloxan diabetes on fetuses of dogs, rabbits and rats, 284
Amentia: See Feeblemindedness; Idiocy
American Board of Pediatrics, physicians certified by, 118, 917
Amino Acids: See also Casein; Proteins
therapy and protein, 923
Aminopterin: See Leukemia
Ammonia and Ammonium Compounds; nephrolithiasis with renal tubular failure, *389
Amnion, dropsy of; association of maternal polyhydramnios with congenital atresia of upper alimentary tract in newborn, 134
Amyoplasia Congenita: See Joints, ankylosis; Muscles, abnormalities
Amyotonia: See Myatonia congenita
Amyotrophy: See Atrophy, muscular
Anaphylaxis and Allergy: See also Asthma; etc.

Anaphylaxis and Allergy—Continued
allergic nature of erythema nodosum produced by sulfathiazole, 803
allergic parotitis, 947
histoplasmin patch test, *65
pseudoinhibition as result of parallergic reaction in measles, 455
pseudoreactions to tuberculin patch test, *302
Anderson, R. J.: BCG vaccination, 280
Anemia, aplastic; chronic hypoplastic anemia, 290
aplastic, in childhood; report of primary idiopathic refractory type, with splenectomy, in 11 year old girl, *516
Cooley's: See Anemia, erythroblastic
Erythroblastic: See also Erythroblastosis, Fetal
erythroblastic, of Cooley, 943
hyperchromic megalocytic, in infants, 943
Hypoplastic: See Anemia, aplastic
infantile pernicious, chances for recovery from form of, 126
Mediterranean: See Anemia, erythroblastic
megaloblastic; pteroylglutamic acid (folic acid); therapeutic indications and limitations, 924
of infection; uptake of radioactive iron in iron-deficient and in pyridoxine-deficient pigs before and after acute inflammation, 943
splenic; heredity in infantile type of Gaucher's disease; report of case, *694
Anencephaly: See Monsters
Anesthesia, local, massive atelectasis following tonsillectomy under; report of case, 610
"open" endotracheal method for harelip and cleft palate operations in infants, 121
Angina: See also Throat
herpetic, in suckling, 612
Ankylosis: See Joints
Anomalies: See Abnormalities and Deformities; and under names of organs and regions
Anoxemia: See Oxygen, deficiency
Anoxia: See Asphyxia neonatorum; Oxygen deficiency
Anthrax, experimental, use of sulfadiazine and penicillin for treatment of, 288
Antibiotics: See also Wounds
morphologic characteristics and antibiotic resistance of Hemophilus influenzae, *659
Antibodies: See Antigens and Antibodies
Antigens and Antibodies: See also Agglutinins and Agglutination; Blood, groups; Immunity; and under specific antigens and reactions, as Whooping Cough; etc.
Klebsiella pneumonia associated with infantile diarrhea, *61
reactions to influenza virus vaccine in infants and children, *295
Antitoxin: See Scarlet Fever; Tetanus; Whooping Cough; etc.
Antrum: See Maxillary Sinus
Tympanicum: See Mastoiditis
Anus: See also Rectum
external anorectal prolapse in children during war years, *671
Aphthae: See Stomatitis
Apnea Neonatorum: See Asphyxia
Apparatus; peritoneal irrigation; method of treatment of acute renal failure in infant, *237
group pure tone hearing test, 460
Appendicitis; review of 936 cases at Cincinnati General Hospital, 793
Appendix, Abscess: See Appendicitis
Appointments announced at Elizabeth Kenny Institute, 818
Apt, L.: Disseminated visceral lesions associated with extreme eosinophilia; pathologic and clinical observations on syndrome of young children, *153
Ara-Takata Test: See Blood, proteins
Arachnodactyly; review of recent literature and report of case with cleft palate, *417 with amyoplasia congenita, 453
Ariboflavinosis: See under Riboflavin
Arithmetic: See Mathematics
Armies: See Military Medicine
Arms: See Forearm; etc.
Arnold, J. H.: Sterile abscess in both buttocks secondary to injection of penicillin in sesame oil, *387
Arobon: See Carob
Arrhythmia: See also Heart, block
paroxysmal tachycardia in small infant, 286
Arsenic and Arsenic Compounds; development and use of BAL; review with reference to arsenical dermatitis, 804
Arteries, Coronary: See Coronary Vessels
pulmonary; Blalock operation for congenital pulmonary stenosis, 942
pulmonary; cardiac hypertrophy in infants due to origination of left branch of coronary artery from pulmonary artery, 135
pulmonary; congenital pulmonary stenosis with closed interventricular septum, 790
pulmonary; tricuspid atresia; report of 2 cases of young infants, with successful operation, *16
Arthritis: See also Rheumatism
rheumatoid; mandibular growth disturbance in childhood, *728
Arthrogryposis Multiplex Congenita: See Joints, ankylosis; Muscles, abnormalities
Articulation: See Speech
Aschoff-Klinge Nodule: See Rheumatic Fever
Ascorbic Acid: See also Scurvy
comparison of stability of reduced ascorbic acid in raw and pasteurized milk, *899
metabolism of adolescent children, 449
metabolism of women during reproductive cycle; effect of multi-vitamin supplements on vitamin C utilization of nursing mothers, 450
metabolism of women during reproductive cycle; vitamin C in diets, breast milk, blood and urine of nursing mothers, 450
renal threshold for; modified method for its estimation with results for 12 adult subjects, 449
subperiosteal hematoma in scurvy (Moeller-Barlow disease), 283
Asphyxia: See also Respiration
anoxia of central nervous system and congenital heart disease; report of 3 cases with note on history of asphyxia, *28
neonatorum; childhood behavior sequela of asphyxia in infancy with reference to pertussis and asphyxia neonatorum, 953
Association Test: See Mental Tests
Asthma: See also Anaphylaxis and Allergy
bronchial, treatment of persons with, 802
with pulmonary hydatid cyst, 612
Ataxia, Friedreich's; genetic relationships between spinal hereditary sclerosis and various forms of tapetoretinal degeneration, 614
Atelectasis: See Lungs, collapse
Atmosphere: See Air
Atresia: See Digestive Tract; Tricuspid Valve
Atrophy: See also under names of organs and regions, as Hypothalamus; etc.
Infantile: See Celiac Disease
Muscular: See also Dystrophy, muscular
muscular; early form of infantile myopathy simulating Hoffmann-Werdnig syndrome (hereditary familial spinal muscular atrophy), 801
muscular; hereditary factors in infantile progressive muscular atrophy; study of 112 cases in 70 families, *226
Audiometer: See Hearing, tests
Audition: See Hearing
Auricular Fibrillation: See Arrhythmia
Avitaminosis: See under Vitamins

B C G: See Tuberculosis
Bacilli: See Bacteria
Backward Children: See Nervous and Mental Disabilities

Bacteria: See also Diphtheria; Pneumococci; Tubercle Bacilli; Typhoid; Viruses; etc.
Anthrax: See Anthrax
Bordet-Gengou: See Whooping Cough
Calmette-Guérin: See Tuberculosis
coli; agglutinating substances for homologous coliform organisms; observations on their occurrence in serum and feces of infants, *717
Corynebacteria: See under Diphtheria
Diphtheria: See under Diphtheria
Dysentery: See Dysentery
enterococci in infectious diarrhea of newborn, 786
Flexner's: See Dysentery
Hemophilus: See Influenza; Whooping Cough
Influenza: See Influenza
invasion of Shigella sonnei of tissues of mice following gavage with viable Shigella, 775
Klebsiella pneumoniae associated with infantile diarrhea, *61
Löffler's: See Diphtheria
morphologic characteristics and antibiotic resistance of Hemophilus influenzae, *659
penicillin in pediatrics, 808
Pertussis: See Whooping Cough
Pneumococci: See Pneumococci
pyocyaneus; unusual strain of Pseudomonas aeruginosa, *252
Shiga's: See Dysentery
Sonne's: See Dysentery
Staining: See Stains and Staining
Streptococci: See Streptococci
Tuberculosis: See Tubercle Bacilli
typhoid group; effect of caronamide on penicillin therapy of experimental pneumococcus and typhoid infections in mice, 775
Bacterium: See Bacteria
Badger, D. C.: Toxic level of fluorine in water supplies, *72
BAL: See Sulfhydryl Compounds
Banti's Disease: See Anemia, splenic
Bardet-Laurence-Biedl Syndrome: See Laurence-Moon-Biedl Syndrome
Barlow's Disease: See Scurvy
Barré-Guillain Syndrome: See Guillain-Barré Syndrome
Basophilism (Cushing): See Cushing Syndrome
Basophils: See Pituitary Body
Behavior; childhood behavior sequela of asphyxia in infancy with reference to pertussis and asphyxia neonatorum, 953
dilantin (diphenylhydantoin sodium) treatment for behavior problem children with abnormal electroencephalograms, 465
end results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
Bell's Palsy: See Paralysis, facial
Benditt, E. P.: Six examples of precocious sexual development; studies in diagnosis and pathogenesis, *484
Beriberi: See also Vitamins, B
infantile, in Singapore during latter part of Japanese occupation, 778
Berman, A. B.: End results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
Bernardin, R. M.: Scarlet fever; diagnostic value of Dick test, white blood cell counts, throat cultures and desquamation, *314
Besman, L.: Vitamin A absorption in newborn, date of receipt of paper, 280
Beswick, R. C.: Congenital anomalies following maternal rubella, *334
Biedl-Laurence Syndrome: See Laurence-Moon-Biedl Syndrome
Biemond Syndrome: See Laurence-Moon-Biedl Syndrome
Biology; relative biologic values of proteins in cereal grains, 922
Biopsies; value of biopsy of liver in nutritional dystrophy; evaluation of treatment with choline and dried stomach, *141
Birth Injuries: See also Newborn Infants
injuries; subdural hematoma and effusion in infants; review of 55 cases, *635
Premature: See Premature Infants
Rate: See Vital Statistics
weight; prenatal estimation by pelvicephalometry, 928
Blackmore, B.: Prothrombin studies on blood of premature infant and value of vitamin K therapy, *686
Bialock Operation: See under Heart
Blennorrhea: See Gonorrhea
Blood: See also Leukocytes; etc.
action of intravenous injections of histamine on blood of hemophilic children, 139
agglutinating substances for homologous coliform organisms; observations on their occurrence in serum and feces of infants, *717
Albumin: See Blood, proteins
calcium; hypocalcemia in neonatal period; clinical study, *537
Carotene: See also Vitamins, A
carotene; effect of ingested mineral oil in plasma carotene and vitamin A, 451
carotene; effect of thyroid hormone and iodine on carotenoids of blood, 120
Cells: See Leukocytes
Circulation: See also Arteries; Capillaries; Heart; etc.
circulation; estimation of velocity of blood flow in children by means of fluorescein, 290
Coagulation: See Blood, prothrombin
Diseases: See Anemia; Hemopoietic System; Leukemia; etc.
effects of castration and treatment with sex steroids on synthesis of serum cholinesterase in rat, 798
effects of various hormonal conditions in intact rat on synthesis of serum cholinesterase, 616
fats and lipoids; chronic relapsing pancreatitis and hyperlipemia, *80
fats and lipoids; effect of nicotinic acid on blood lipids of normal infants, 283
Formation: See Hemopoietic System
Globulin: See Blood, proteins
Groups: See also Agglutinins and Agglutination; Blood, transfusion
groups; cause of nuclear jaundice in neonatal sepsis with jaundice, 930
groups; clinical application of Rh factor, 783
groups; detection, differentiation and titration of anti-Rh antibodies, 929
groups; frequency of Rh factor among Italian population, 453
groups; hemolytic disease of newborn and importance of Rh factors, 454
groups; hemolytic disease of newborn; 2 rare cases, 785
groups; Rh factor in Netherlands, 932
Lipoids: See Blood, fats and lipoids
maintenance of therapeutic blood concentrations of penicillin for 24 hours following single injections of penicillin-beeswax-peanut oil mixtures, 294
metabolism of women during reproductive cycle; vitamin C in diets, breast milk, blood and urine of nursing mothers, 450
nicotinamide and phosphorus in, 452
phosphatase; phosphatemia and clinical signs of rickets; their relation to massive doses of vitamin D, 283
phosphorus; variations in blood phosphorus levels (inorganic, lipid and total) in 3 cases of progressive muscular dystrophy after insulin stimulation, 800
plasma volume in nephritis, 797
Platelets: See Purpura
proteins; disseminated visceral lesions associated with extreme eosinophilia; pathologic and clinical observations on syndrome of young children, *153

Blood—Continued
proteins; significance of Weltmann and Takata-Ara reactions in blood serum of newborn infants, 454
proteins; use of gamma globulin from large pools of adult blood plasma in certain infectious diseases, 937
prothrombin; hypothrombinemia after newborn period, 786
prothrombin; significance of vitamin K in pediatrics; latent hypoprothrombinemia in healthy children, 925
prothrombin studies on blood of premature infant and value of vitamin K therapy, *686
pyruvic acid level; significance in infancy; further observations, 924
radioactive phosphorus as therapeutic agent; review of literature and analysis of results of treatment of 155 patients with various blood dyscrasias, lymphomas and other malignant neoplastic diseases, 294
reducing properties; blood redox reaction as test for vegetative nervous function, 464
sedimentation; chorea (Sydenham); study of 58 additional patients, *306
serum calcium and blood inorganic phosphorus levels after massive therapy with vitamin D_2 in children with tuberculosis, 790
significance of positive blood cultures in newborn infants, 783
Sugar: See also Carbohydrates; Diabetes Mellitus; Insulin; etc.
sugar; cold sweating, hypoglycemia and carbohydrate insufficiency, 802
sugar; work performance, respiratory exchange and certain blood constituents after isocaloric meals of low and high carbohydrate content, 281
Transfusion: See also Anemia; Blood, groups
transfusion in nephritis, 293
transfusion in newborn infants through abdominal wall segment of umbilical vein, 783
transfusion; leukemia in children; effect of intravenous serum therapy, 125
transfusion, replacement, in erythroblastosis fetalis; report of 24 cases, 929
Vessels: See Arteries; Capillaries; etc.
Body Fluids: See Fluids
Height: See Height
Weight: See Weight
Bones: See also under names of bones
Conduction: See Hearing, tests
Diseases: See Osteomyelitis; etc.
fragility; periosteal dysplasia; case of spontaneous cure, 618
growth, influence of hypervitaminosis A on, 778
marrow; aplastic anemias in childhood; report of primary idiopathic refractory type, with splenectomy, in 11 year old girl, *516
marrow; disseminated visceral lesions associated with extreme eosinophilia; pathologic and clinical observations on syndrome of young children, *153
marrow in visceral leishmaniasis in children, 124
roentgen diagnosis of rickets associated with other skeletal diseases of infants and children, 924

Book Reviews:

Aureomycin—New Antibiotic; B. M. Duggar and others, 819
Clinical Studies of Besnier's Prurigo (Synonyms: Atopic Dermatitis, Eczema Prurigo Allergicum, Neurodermatitis Disseminata) with Special Reference to Its Course, Significance of Airborne Allergens and value of Certain Methods of Treatment; P. H. Nexmand, 140
Development of Basic Rorschach Score with Manual of Directions; C. Bühler, K. Bühler and D. W. Lefever, 58
Book Reviews—Continued
Educational for Professional Responsibility, 57
Food Value Charts, 819
Rh Blood Groups and Their Clinical Effects; P. L. Mollison, A. E. Mourant and R. R. Race, 659
Sindroma anémico do kala-azar; C. Trincão, 140
Technik der kinderärztlichen Differentialdiagnostik; A. Solé, 819
Traitement moderne des méningites purulentes aigues; R. Martin and B. Sureau, 959
Tuberculosis in Childhood; D. S. Price, 957
Zieke zuigelingen: Een beknopte handleiding voor de huistarts bij de behandeling van de belangrijkste zuigelingenziekten; C. H. Verboom, 140

Books; revised edition of booklet of motion picture reviews now available, 466
Bouillaud's Disease: See Rheumatic Fever
Bowels: See Intestines
Brain: See also Hypothalamus; Meninges; Nervous System; etc.
abscess, otogenic, 791
anoxia of central nervous system and congenital heart disease; report of 3 cases with note on history of asphyxia, *28
Diseases: See also Encephalitis; etc.
diseases; encephalopathies in children following burns, 796
electroencephalography; dilantin (diphenylhydantoin sodium) treatment for behavior problem children with abnormal electroencephalograms, 465
electroencephalography; febrile convulsions in childhood; clinical and electroencephalographic study, *868
encephalitis and involvement of basal nuclei in poliomyelitis, *561
familial hypoplasia of, 950
in case of human cyclopia, 781
in infantile cerebral palsy, 129
Inflammation: See Encephalitis
Injuries: See Head injuries; etc.
Sclerosis: See Sclerosis
tumors in children; diagnosis and basis for therapy, 464
Brandt, S.: Hereditary factors in infantile progressive muscular atrophy; study of 112 cases in 70 families, *226
Bread: See Flour
Breast, Feeding: See Infant Feeding; Milk, human
Milk: See Infant Feeding: Lactation; Milk, human
Breathholding: See Respiration
Bright's Disease: See Nephritis
Brodie, A. G.: Mandibular growth disturbance in rheumatoid arthritis of childhood, *728
Bronchi, carcinoma, primary, at age of 4 years, 4 months, 946
Dilatation: See Bronchiectasis
Diseases: See Bronchiectasis; Bronchitis; Bronchopneumonia
foreign body removed after 4 months, 127
Spasm: See Asthma
Bronchiectasis: See also Lungs, cysts
associated with simulated dextrocardia; report of case, 946
Bronchitis; treatment with massive doses of sulfamidothiazole in pneumonia, bronchopneumonia and bronchitis in children, 127
Bronchopneumonia: See also Pneumonia
acute respiratory disorders among newborn infants in obstetric nurseries; experience in New York city, 1940 to 1948, *883
treatment with massive doses of sulfamidothiazole in pneumonia, bronchopneumonia and bronchitis in children, 127
Buerger, W. R.: Peritoneal irrigation; method of treatment of acute renal failure in infant, *237

Buffalo Milk: See Milk
Buphthalmos: See Hydrophthalmos
Burns, encephalopathies in children following, 796
Bustamante, J. I.: Antipertussis serum (animal), *320
Butler, S.: Action of intravenous injection of histamine on blood of hemophilic children, 139
Butterfat; effect of mixed tocopherols on milk and butterfat production of dairy cow, 923
Buttocks; sterile abscess in both buttocks secondary to injection of penicillin in sesame oil, *387

Calciferol: See Vitamins, D
Calcification: See Bones, growth; Teeth; etc.
Calcium and Calcium Compounds; calcium and phosphate balances after administration of pure calcium salts and pulverized whole bone, 777
calcium enriched meat compared with milk as source of calcium, phosphorus and protein, 282
in Blood: See Blood, calcium
multiple calcareous deposits in intestinal tract of newborn; report of case associated with stenosis of ileum, *393
Calculi: See Kidneys; Ureters, calculi; etc.
Calories: See Metabolism
Camp, R.: Multiple calcareous deposits in intestinal tract of newborn; report of case associated with stenosis of ileum, *393
Cancer: See Epithelioma; Tumors; and under names of organs and regions, as Bronchi; etc.
Candida: See Moniliasis
Capillaries; cause and significance of seasonal variation in hemorrhagic tendency in newborn, 931
Carbohydrates; cold sweating, hypoglycemia and carbohydrate insufficiency, 802
Metabolism: See Blood, sugar; Diabetes Mellitus; etc.
work performance, respiratory exchange and certain blood constituents after isocaloric meals of low and high carbohydrate content, 281
Carbon Dioxide: See Metabolism; Respiration
Carbonic Anhydrase: See Enzymes
Carbuncle, Renal: See Nephritis
Carcinoma: See under names of organs and regions
Cardiomegaly: See Heart, hypertrophy
Cardiovascular System: See Arteries; Heart; etc.
Carob flour (arobon®) and its antidyspeptic properties, 795
Caronamide: See Sulfonamides
Carotene: See also Vitamins, A
effect of ingested mineral oil in plasma carotene and vitamin A, 451
Carotenoids: See Blood, carotene
Carriers: See Diphtheria; Poliomyelitis; Scarlet Fever; Typhoid
Casein; comparative nutritive value of casein and lactalbumin for man, 282
Castration; distribution of Feulgen and 2, 4-dinitrophenylhydrazine reactions in normal, castrated, adrenalectomized and hormonally treated rats, 799
effects of castration and treatment with sex steroids on synthesis of serum cholinesterase in rat, 798
Catabolism: See Metabolism
Catatonia: See Dementia Precox
Celiac Disease; cold sweating, hypoglycemia and carbohydrate insufficiency, 802
folic acid treatment of celiaca, 950
Cells: See Tissue
Cephalometry: See Craniometry
Cereals; relative biologic values of proteins in cereal grains, 922
Cerebrospinal Fever: See Meningitis
Cerebrospinal Fluid: See also Spinal Puncture
transfer of penicillin in spinal fluid following parenteral administration, 129
Cerebrum: See Brain
Cevitamic Acid: See Ascorbic Acid
Chauffard-Still Disease: See under Arthritis
Chemotherapy: See under names of diseases and chemotherapeutic agents, as Diarrhea; Leukemia; Meningitis; Penicillin; Pneumonia; Poliomyelitis; Respiratory Tract; Scarlet Fever; Sulfonamides; Tuberculosis; etc.
Chiasm, Optic: See Optic Chiasm
Child Guidance: See Mental Hygiene
Child Welfare: See also Infant Welfare
mixed short-term day nursery, 927
trial of whooping cough vaccine in city and residential nursery groups; report to Medical Research Council, 933
Children: See also Infants; Newborn Infants; Pediatrics; Schools; etc.
Growth: See Growth
Nervous and Mental Disabilities: See Nervous and Mental Disabilities
Nutrition: See Diet and Dietetics; Nutrition; Schools; etc.
trends in age distribution of childhood diseases, 623
Chloroethylamines; nitrogen mustard therapy; studies on effect of methyl-bis (beta-chloroethyl)amine hydrochloride on neoplastic diseases and allied disorders of hemopoietic system, 956
nitrogen mustard therapy; use of methyl-bis (beta-chloroethyl)amine hydrochloride and tris (beta-chloroethyl)amine hydrochloride for Hodgkin's disease, lymphosarcoma, leukemia and certain allied and miscellaneous disorders, 955
nitrogen mustards in treatment of neoplastic disease; official statement, 955
Cholera, Infantile: See Diarrhea
Choline and Choline Derivatives; value of biopsy of liver in nutritional dystrophy; evaluation of treatment with choline and dried stomach, *141
Cholinesterase: See under Blood
Chondrodysplasia: See Dyschondroplasia
Chorea (Sydenham); study of 58 additional patients, *306
Choriomeningitis; intracranial hypotension with ventricular collapse in course of lymphocytic meningitis of unknown origin, 130
Cinematography: See Moving Pictures
Circulation: See Blood, circulation
Clavicle, fracture in newborn, 932
Cleft Palate: See Palate
Climate: See Seasons
Clinics; outlines for well baby clinics; recording development of second 12 months, 780
Clubfoot: See Foot, deformities
Cocarboxylase: See Urine
Cold agglutinins in normal children, 126
Colds: See under Respiratory Tract
Colitis; evaluation of vagotomy in chronic nonspecific ulcerative colitis, 948
ulcerative; psychoanalytic study in children, 128
Collett, R. W.: Chronic relapsing pancreatitis and hyperlipemia, *80
Colliculus Seminalis: See Verumontanum
Collodion Disease: See Ichthyosis
Colon: See also Gastrointestinal Tract; Intestines
dilatation; parasympathetic factor in megacolon, 795
Inflammation: See Colitis
Color Blindness, congenital, is it possible to influence? 619
Colostrum: See also Infant Feeding
composition of human colostrum and milk, *589

Colostrum—Continued
placental and mammary transfer of tocopherols (vitamin E) in sheep, goats and swine, 923
Coma: See under Blood, sugar; Diabetes Mellitus; Insulin
Communicable Diseases: See also Exanthems; Immunity; Measles; Meningitis; Syphilis; etc.
acute adrenal insufficiency in infancy, 292
use of gamma globulin from large pools of adult blood plasma in certain infectious diseases, 937
Complement Fixation: See Parotitis; Psittacosis; Whooping Cough
Congress: See Societies
Consonants: See Speech
Contagious Diseases: See Communicable Diseases
Convalescent Serum: See Measles; Pneumonia; Scarlet Fever; etc.
Convulsions: See also Epilepsy; Tetany; etc.
febrile, in childhood; clinical and electroencephalographic study, *868
infantile, hypocalcemia in causation of, *768
infantile, nature of, *763
Cook County, report of Joint Maternal Welfare Committee of, 134
Cooking; effect of cooking and curing on lysine content of pork luncheon meat, 281
Cordes, V. C.: Sterile abscess in both buttocks secondary to injection of penicillin in sesame oil, *387
Cornea, softening; avitaminosis A in giardiasis, *257
Cornelian corner and its rationale, 465
Coronary Sinus: See Heart, blood supply
Coronary Vessels; cardiac hypertrophy in infants due to origination of left branch of coronary artery from pulmonary artery, 135
Coronel, L.: Value of biopsy of liver in nutritional dystrophy; evaluation of treatment with choline and dried stomach, *141
Corynebacteria: See under Diphtheria
Craniometry; prenatal estimation of birth weight by pelvicephalometry, 928
Craniotabes; congenital rickets, 778
Cranium: See also Craniometry; etc.
Abnormalities: See Acrocephaly; etc.
exostoses; congenital ulcer of skin and bone of skull (Ombrédanne's disease), 453
intracranial hemorrhage and aseptic purulent meningitis in newborn infants, *384
intracranial hypotension with ventricular collapse in course of lymphocytic meningitis of unknown origin, 130
Steeple Skull: See Acrocephaly
Creatine and Creatinine; urinary glycocyamine, creatine and creatinine; their excretion in children with nephrotic syndrome, *67
Croup, Diphtheritic: See Diphtheria, laryngeal
Crying, night; brief report on sampling of certain opinions of local pediatricians, 815
Cryptorchidism: See Testes, undescended
Crystalline Lens: See Lens, Crystalline
Cugell, D. W.: Spontaneous pleural effusion in newborn infant, *569
Culture Mediums: See under Bacteria; etc.
Curing; effect of cooking and curing on lysine content of pork luncheon meat, 281
Cushing Syndrome due to tumor of adrenal cortex; report of case of 11 month old infant, with apparent operative cure, *260
Cyanosis: See also Heart, abnormalities; Methemoglobinemia
caused by methemoglobinemia, *77
tricuspid atresia; report of 2 cases of young infants, with successful operation, *16
Cyclopia: See Monsters
Cysticercosis: See Echinococcosis
Cysts: See under names of organs and regions, as Mediastinum; Lungs; etc.
Dermoid: See Tumors, dermoid
Echinococcus: See Echinococcosis
Hydatid: See Echinococcosis
Cytochrome Oxidase: See Oxidase and Peroxidase

Dactylitis: See Fingers and Toes
Danlos-Ehlers Syndrome: See Joints; Skin, abnormalities
Darling's Disease: See Histoplasmosis
Dauis-Lawas, D. F.: Heredity in infantile type of Gaucher's disease; report of case, *694
Davis, C. B., Jr.: Tricuspid atresia; report of 2 cases of young infants, with successful operation, *16
Deafness: See also Ear, diseases; Hearing; Otitis Media
rubella-deafened infants; comparison of group of rubella-deafened children with group of hereditarily deaf children and their sibs, *182
testing of lip reading achievement; preliminary investigation, 461
Death Rate: See Infant Mortality; Vital Statistics
Defectives: See Feeblemindedness; Nervous and Mental Disabilities; etc.
Deficiency Diseases: See Diet and Dietetics; Nutrition; Vitamins; etc.; and under names of various diseases, as Beriberi; Scurvy; etc.
Deformities: See Abnormalities and Deformities; and under names of organs and regions
Dehydration therapy; measles encephalitis; study of 50 cases, *844
Dementia Precox; schizophrenia in childhood, 132
Demography: See Population
Dentin: See Teeth
Dentition: See Teeth
Dermatitis; development and use of BAL; review with reference to arsenical dermatitis, 804
Hemorrhagic: See Purpura
Dermatoses: See Dermatitis; Skin, diseases; etc.
Dermoid Cysts: See Tumors, dermoid
Desensitization: See Anaphylaxis and Allergy
Dew, R. R.: Antipertussis serum (animal), *320
Dextrocardia: See Heart, displacement
DeYoung, V. R.: Association of maternal polyhydramnios with congenital atresia of upper alimentary tract in newborn, 134
Diabetes Mellitus: See also Blood, sugar; Insulin
effect of pregnancy complicated by alloxan diabetes on fetuses of dogs, rabbits and rats, 284
Diarrhea: See also Dysentery
agglutinating substances for homologous coliform organisms; observations on their occurrence in serum and feces of infants, *717
carob flour and its antidyspeptic properties, 795
enteroccocci in infectious diarrhea of newborn, 786
epidemic, of newborn, viral studies on etiology of, 794
infant and childhood morbidity in Salzburg following war, 284
infantile, associated with Klebsiella pneumoniae, *61
measures for protection of newborn infants; description of measures instituted in May 1937 at Long Island College Hospital; practical experiences with prophylaxis of diarrhea; management of diarrhea epidemic, 121

Diarrhea—Continued
spread of unknown origin in ward for infants, *217
standardized plan of treatment for gastroenteritis in infants, 948
Diathermy: See under names of diseases, organs and regions
Diathesis, Allergic: See Anaphylaxis and Allergy; Asthma
Hemorrhagic: See Hemophilia; Purpura; Scurvy; etc.
Dick Test: See Scarlet Fever
Diet and Dietetics: See also Nutrition; Rations; Vitamins; and under names of foods, as Fat; Meat; Milk; etc.
effect of diet on fetal development, 922
introduction to vitamin therapy, 451
metabolism of women during reproductive cycle; vitamin C in diets, breast milk, blood and urine of nursing mothers, 450
reproduction and lactation studies with rats fed natural and purified rations, 922
study of relation between protein efficiency and gain in weight on diets of constant protein content, 282
Diethylstilbestrol: See Estrogens
Digestion: See under Fat
Digestive System: See also Gastrointestinal Tract; Intestines; Pancreas; Stomach; etc.
association of maternal polyhydramnios with congenital atresia of upper alimentary tract in newborn, 134
introduction to vitamin therapy, 451
Dihydrostreptomycin: See Streptomycin
Dilantin: See Nervous and Mental Disabilities
Dinitrophenylhydrazine: See Stains and Staining
Diphenylhydantoin Sodium: See Nervous and Mental Disabilities
Diphtheria; action of aerosol penicillin on Corynebacterium diphtheria, 607
bacilli, penicillin treatment for carriers of, 936
diphtheritic gingivitis and stomatitis, 936, 937
immunization with diphtheria toxoid and pertussis vaccine Sauer during epidemic of whooping cough, 934
in pediatric clinic of Florence, Italy, 1941 to 1943, 454
in Perugia in relation to antidiphtheritic vaccination, 933
laryngeal, and other infections, 122
tonsillectomy during convalescence from, 935
Diplegia: See Paralysis
Directory of pediatric societies, 625
Disease; introduction to vitamin therapy, 451
penicillin in pediatrics, 956
trends in age distribution of childhood diseases, 623
Disk, Optic: See Nerves, optic
Dislocations: See under names of joints
Diverticula: See Intestines
Dodd, K.: Hypocalcemia in neonatal period; clinical study, *537
Dolichostenomelia: See Arachnodactyly
Dowell, M.: Antipertussis serum (animal), *320
Dropsy: See Amnion; Erythroblastosis, Fetal; etc.
Drowsiness: See Sleep
Drugs, autonomic, reaction of children to, 956
Dubos Medium: See Tuberculosis
Duct, Omphalomesenteric: See Vitelline Duct
Ductless Glands: See Endocrine Glands
Dunphy, D. L.: Agglutinating substances for homologous coliform organisms; observations on their occurrence in serum and feces of infants, *717
Dwarfism in healthy children; its possible relation to emotional, nutritional and endocrine disturbances, 776
renal, in nursling, 615
Dyschondroplasia; genetics of osteochondrodystrophy, 955
Dysentery: See also Diarrhea
invasion by Shigella sonnei of tissues of mice following gavage with viable Shigella, 775
Dyspepsia: See Diarrhea
Dyspnea; stimulation of mandibular growth in congenital micrognathia by traction, *750
Dystocia: See Labor
Dystrophy, Adiposogenital: See Laurence-Moon-Biedl Syndrome
increased incidence of rickets in dystrophic children, 925
Muscular: See also Atrophy, muscular; etc.
muscular, progressive; variations in blood phosphorus levels (inorganic, lipid and total) in 3 cases after insulin stimulation, 800
nutritional, value of biopsy of liver in; evaluation of treatment with choline and dried stomach, *141
Dysvitaminosis: See under Vitamins

Ear: See also Deafness; Hearing; etc.
Diseases: See also Otitis Media
diseases of infants, 791
external; use of streptomycin in treatment of diffuse external otitis, 944
Eberthella: See Typhoid
Echinococcosis: pulmonary hydatid cyst with asthma, 612
Ectopia Cordis: See Heart, displacement
Edema, gelatinous; pathognomonic sign in mumps, *903
Nephrotic: See Nephritis
Education: See also Schools
continuation course in pediatric roentgenology, 604
end results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
short courses in diagnosis and treatment of poliomyelitis patients announced, 279
variation in intelligence quotient in 10 mentally deficient children under pedagogic plan, 131
Ehlers-Danlos Syndrome: See Joints; Skin, abnormalities
Eisenmenger's Tetralogy: See Heart, abnormalities
Electrocardiogram: See under Heart
Electrocoagulation: See under specific headings
Electroencephalography: See under Brain
Electromyography: See Muscles
Elementary Schools: See Schools
Elvidge, A. R.: Subdural hematoma and effusion in infants; review of 55 cases, *635
Embryology: See Fetus; Monsters; Teratoma; and under names of special organs and structures
Emesis: See Vomiting
Emotions; dwarfism in healthy children; its possible relation to emotional, nutritional and endocrine disturbances, 776
socioemotional factors accounting for growth failure in children living in institution, 780
Emphysema; chronic emphysematous cavity of lung, *755
fatal interstitial and mediastinal, following accidental needle perforations of trachea during jugular venipuncture, *375
Empyema, pneumococcic, treated with penicillin, 612
treatment with intrapleural administration of penicillin, 792
Encephalitis: See also Meningoencephalitis and involvement of basal nuclei in poliomyelitis, *561
epidemic, in military personnel; isolation of Japanese B virus on Okinawa in 1945, serologic diagnosis, clinical manifestations, epidemiologic aspects and uses of mouse brain vaccine, 614
hemorrhagic; Wernicke's syndrome due to vitamin B deficiency; report of disease in 2 infants, *88

Encephalitis—Continued
measles encephalitis; study of 50 cases, *844
postvaccination; problem in differential diagnosis, *248
topographic distribution of lesions in central nervous system in Japanese B encephalitis; nature of lesions, with report of case on Okinawa, 613
Encephalography: See under Brain
Encephalomeningitis: See Meningoencephalitis
Endocarditis, subacute bacterial; immunologic studies in patients treated by combined penicillin-heparin method; report of sensitivity to heparin in patient, 943
subacute bacterial; treatment with penicillin in peanut oil and beeswax, 290
Endocardium: See Endocarditis; Heart
Endocrine Glands: See also Hormones; Metabolism; and under names of glands
leukocytic formula in newborn in relation to that in mother and endocrinology of gestation, 286
Endocrine Therapy: See under names of glands and hormones, as Insulin; etc.
Energy Exchange: See Metabolism
Engel, M. B.: Mandibular growth disturbance in rheumatoid arthritis of childhood, *728
Enteritis: See under Colitis; Diarrhea; Dysentery; Gastrointestinal Tract; Intestines; etc.
Enterobiasis: See Oxyuriasis
Enterococci: See Bacteria
Enterocolitis: See Diarrhea; Intestines; etc.
Enuresis: See Urination, incontinence
Environment factors in relation to speech of cerebral palsied children, 952
Enzymes: See also Blood, enzymes; Pancreas; Yeast; and under names of enzymes
carbonic anhydrase in central nervous system of developing fetus, 780
Eosinophilia and scarlet fever, 606
disseminated visceral lesions associated with extreme eosinophilia; pathologic and clinical observations on syndrome of young children, *153
scarlet fever; diagnostic value of Dick test, white blood cell counts, throat cultures and desquamation, *314
Epidermis: See Skin
Epidermolysis bullosa, *708, 812
Epilepsy: See also Convulsions
nature of infantile convulsions, *763
Epiphyses; congenital luxation of superior epiphysis of radius, 804
Epithelioma, intestinal, in 10 year old girl, 948
Epituberculosis: See Tuberculosis, pulmonary
Equilibrium, Acid-Base: See Acid-Base Equilibrium
Erythema nodosum produced by sulfathiazole, allergic nature of, 803
Erythredema: See Acrodynia
Erythremia: See Polycythemia
Erythroblastosis, Fetal: See also Anemia, erythroblastic; Hemopoietic System
hemolytic disease of newborn, 930
hemolytic disease of newborn and importance of Rh factors, 454
hemolytic disease of newborn in South African natives, 931
hemolytic disease of newborn; 2 rare cases, 785
histologic aspects of late sequela of kernicterus, 122
replacement transfusion in; report of 24 cases, 929
reproductive histories of mothers of 322 infants with, 784
treatment of, 930
Erythroblasts: See Anemia, erythroblastic
Erythrocytes: See Anemia; Polycythemia; etc.
Erythroderma, Ichthyoid: See Ichthyosis
Esophagus, congenital anomalies related to esophageal foreign bodies, *467
Esophagus—Continued
foreign body with mediastinitis and other complications, 794
stricture following typhoid fever, 938
Espinoza, J.: Value of biopsy of liver in nutritional dystrophy; evaluation of treatment with choline and dried stomach, *141
Estradiol: See Estrogens
Estrin: See Estrogens
Estrogens: See also Hormones; Ovary
ichthyosis treated with stilbestrol, 803
Ethylstilbestrol: See Estrogens
Exanthems: See also Communicable Diseases; and under names of exanthematous diseases
pseudoinhibition as result of parallergic reaction in measles, 455
Exercise; advisory center and institute for preventive physical exercises, 622
rationale of blowing exercises for patients with repaired cleft palates, 452
velopharyngeal, 285
Exsiccosis: See Dehydration
Extrasystole: See Arrhythmia
Extremities, Paralysis: See Poliomyelitis
Eyes: See also Macula Lutea; Orbit; and under names of special structures and diseases
Diseases: See Ophthalmia; etc.
early ocular manifestations in Laurence-Moon-Biedl syndrome, 133

Face, Abnormalities: See Harelip
Paralysis: See Paralysis, facial
Fanconi Syndrome: See Dwarfism, renal
Fat digestion and gastric evacuation, 128
effects of autoxidation on antiacrodynic potency of fats and linoleic esters, 775
in Blood: See Blood, fats and lipoids
Fatt, L. E., appointment to Brookhaven National Laboratory, 604
Feces; agglutinating substances for homologous coliform organisms; observations on their occurrence in serum and feces of infants, *717
brief report on sampling of certain opinions of local pediatricians (toilet training), 815
Feeblemindedness: See also Idiocy; Laurence-Moon-Biedl Syndrome; etc.
end results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
phenylpyruvic oligophrenia; 2 cases of siblings, *759
variation in intelligence quotient in 10 mentally deficient children under pedagogic plan, 131
Feeling: See Emotions
Feer's Disease: See Acrodynia
Feet: See Foot
Fell, E. H.: Tricuspid atresia; report of 2 cases of young infants, with successful operation, *16
Fellows, Mead Johnson, 917
Felty Syndrome: See Splenomegaly
Femur; subperiosteal hematoma in scurvy (Moeller-Barlow disease), 283
Ferments: See Enzymes
Fertility: See Reproduction
Fetus: See also Labor; Monsters; Pregnancy
Amorphus: See Monsters
Asphyxia: See Asphyxia
carbonic anhydrase in central nervous system of developing fetus, 780
effect of diet on fetal development, 922
effect of pregnancy complicated by alloxan diabetes on fetuses of dogs, rabbits and rats, 284
Injuries: See Birth injuries; Newborn Infants
Pathology: See Hydrocephalus
prenatal estimation of birth weight by pelvicephalometry, 928
Feulgen Reaction: See Stains and Staining
Fever: See also Malaria; Typhoid; etc.
Cerebrospinal: See Meningitis
Eruptive: See Exanthems

Fever—Continued
febrile convulsions in childhood; clinical and electroencephalographic study, *868
Spotted: See Meningitis
Fibrosis: See Pancreas
Fibrositis: See Rheumatism
Filariasis; further evaluation of skin test in man based on results obtained in British Guiana, 289
Fingers and Toes: See also Foot; Reflex; etc.
Abnormalities: See Arachnodactyly; Polydactylia
congenital giant thumb, 284
Nails: See Nails
syphilitic dactylitis, 609
Fitzgerald, J. E.: Report of Joint Maternal Welfare Committee of Cook County, 134
Flood, R. G.: Urinary glycocyamine, creatine and creatinine; their excretion in children with nephrotic syndrome, *67
Flour: See also under Carob
improving nutritive value of; effect of supplementing enriched flour with other B complex vitamins, 281
Fluids; volume of extracellular body fluids in malnutrition, 924
Fluorescein Method: See Blood, circulation
Fluorides; dental fluorosis, 623
toxic level of fluorine in water supplies, *72
Fluorine: See Fluorides
Fluorosis: See Fluorides
Foley, G. E.: Morphologic characteristics and antibiotic resistance of Hemophilus influenzae, *659
Folic Acid: See also Vitamins, B
pteroylglutamic acid; therapeutic indications and limitations, 924
treatment of celiaca, 950
Food: See Diet and Dietetics; Nutrition; Vitamins; and under names of various foods, as Fat; Meat; Milk; etc.
Foot: See also Fingers and Toes; etc.
Deformities: See also Poliomyelitis
deformities; subluxation of foot, or clubfoot, 618
Forearm, congenital deformities of, 453
Foreign Bodies: See also under names of organs and regions
congenital anomalies of esophagus related to esophageal foreign bodies, *467
esophageal, with mediastinitis and other complications, 794
in respiratory tract, 610
removed from bronchus after 4 months, 127
Fousek, M. D.: Agglutinating substances for homologous coliform organisms; observations on their occurrence in serum and feces of infants, *717
Fox, M. J.: Prophylaxis of whooping cough, *677
Fractures: See Clavicle
Francis, T., Jr.: Reactions to influenza virus vaccine in infants and children, *295
Friedreich's Ataxia: See under Ataxia
Fruit; accelerated production of poliomyelitis, *1
Fungi: See Monliiasis; etc.
Fyala, M. A.: Scarlet fever; diagnostic value of Dick test, white blood cell counts, throat cultures and desquamation, *314

Gallbladder, congenital absence of, 947
Games: See Play
Gamma Globulin: See Blood, proteins
Gastroenteritis: See Diarrhea; Intestines; etc.
Gastrointestinal Tract: See also Colon; Digestive System; Intestines; Rectum; Stomach; etc.
accelerated production of poliomyelitis, *1
splenomegaly with profuse bleeding into, 943
Gasul, B. M.: Cardiac hypertrophy in infants due to origination of left branch of coronary artery from pulmonary artery, 135
Tricuspid atresia; report of 2 cases of young infants, with successful operation, *16
Gaucher's Disease: See Anemia, splenic
Gee's Disease: Celiac Disease
Genetics: See Heredity
Genitals: See also Urinary Tract; and under names of genitals as Testes; Vagina; etc.
malformation in newborn infant; report of case, 616
Genitourinary Tract: See Genitals; Urinary Tract; and under organs of genitourinary tract
German Measles: See Rubella
Germicid®; condition resembling porphyrinuria, 132
Gestation: See Pregnancy
Giardiasis: See Lambliasis
Gibson, S., receives honorary degree, 280
Gingivitis: See Gums
Glands: See under names of glands, as Adrenals; Endocrine Glands; etc.
Globulin, in Blood: See Blood, proteins
treatment of scarlet fever with human immune globulin, *437
Glomerulonephritis: See Nephritis
Glycemia: See Blood sugar
Glycocyamine, urinary, creatin and creatinine; their excretion in children with nephrotic syndrome, *67
Glycosuria: See Diabetes Mellitus
Goldstein, H. M.: Cushing's syndrome due to tumor of adrenal cortex; report of case of 11 month old infant, with apparent operative cure, *260
Goldstein, P.: Fatal interstitial and mediastinal emphysema following accidental needle perforations of trachea during jugular venipuncture, *375
Gonads: See Endocrine Glands; Genitals; Hermaphroditism; Ovary; Testes
Gonococci, Infections: See under Gonorrhea; Ophthalmia neonatorum
Gonorrhea, infantile; ambulatory treatment by oral administration of penicillin, 607
Gordon Test: See Hodgkin's Disease
Graduate Course: See Education
Grains; relative biologic values of proteins in cereal grains, 922
Grants approved for trainee in psychiatry, 604
Granulocytes: See Leukocytes
Granuloma; disseminated visceral lesions associated with extreme eosinophilia; pathologic and clinical observations on syndrome of young children, *153
Malignant: See Hodgkin's Disease
Gravidity: See Pregnancy
Greengard, J.: Congenital anomalies of esophagus related to esophageal foreign bodies, *467
Grip: See Influenza
Growth: See also Diet and Dietetics; Nutrition; etc.
mental aspects of growth and health, 796
socioemotional factors accounting for growth failure in children living in institution, 780
some observations in children, 780
Guerrero, R. M.: Wernicke's syndrome due to vitamin B deficiency; report of disease in 2 infants, *88
Guillain-Barré Syndrome in children, 951
meningoradiculitis and syndrome of Guillain-Barré and Strohl, 291
Gumma, Syphilitic: See Syphilis, tertiary
Gums: diphtheritic gingivitis and stomatitis, 936, 937

Haemophilus Influenzae: See Influenza
Pertussis: See Whooping Cough
Hand: See also Fingers and Toes
mongolism; objective early sign (palmar dermatoglyphics), 131
Handicapped: See Feeblemindedness; Idiocy
Hardy, L. M.: Bronchiogenic cysts of mediastinum, 136
Harelip; "open" endotracheal method of anesthesia for harelip and cleft palate operations in infants, 121
Hay Fever: See Anaphylaxis and Allergy

Hayem-Luzet-von Jaksch Disease: See Anemia, erythroblastic
Head: See also Cranium
injuries; subdural hematoma and effusion in infants; review of 55 cases, *635
Health; mental aspects of growth and health, 796
Hearing: See also Deafness
Aids: See Deafness
reliability and validity of monitored connected discourse as test of threshold of intelligibility, 952
tests; group pure tone hearing test, 460
Heart: See also Arrhythmia; Blood, circulation; under names of various conditions, as Rheumatic Fever; etc.
Abnormalities: See also Heart, displacement; Heart, hypertrophy; etc.
abnormalities; anoxia of central nervous system and congenital heart disease; report of 3 cases with note on history of asphyxia, *28
abnormalities; physiologic studies in congenital heart disease; results obtained in 5 cases of Eisenmenger's complex, 942
Blalock operation for congenital pulmonary stenosis, 942
block, auriculoventricular, familial congenital complete, 791
block, congenital, 291
blood supplies; drainage of pulmonary veins into coronary sinus, *906
Bouillaud's disease (acute rheumatic fever) in small children, 787
congenital pulmonary stenosis with closed interventricular septum, 790
Diseases: See also Endocarditis; etc.
Diseases, Congenital: See Heart, abnormalities
displacement; simulated dextrocardia associated with bronchiectasis; report of case, 946
drainage of pulmonary veins into coronary sinus, *906
electrocardiogram in diagnosis and management of rheumatic fever, 123
hypertrophy; cardiac enlargement in uncomplicated mitral insufficiency in children, *703
hypertrophy in infants due to origination of left branch of coronary artery from pulmonary artery, 135
importance of continuous or recidivating activity in rheumatic fever in childhood, 933
production of acute rheumatic-like heart lesions in mice, 937
size during rheumatic fever in children, 788
Valves: See under names of valves, as Mitral Valve; Tricuspid Valve; etc.
Heat; comparison of stability of reduced ascorbic acid in raw and pasteurized milk, *899
Production: See Metabolism
Height: See also Growth
and weight in relation to onset of puberty in boys, 779
Heine-Medin Disease: See Poliomyelitis
Heller, G.: Gelatinous edema; pathognomonic sign in mumps, *903
Hemagglutinins: See Agglutinins and Agglutination
Hemangioendothelioma of liver in infant 25 days of age, 950
Hematemesis; splenomegaly with profuse bleeding into gastrointestinal tract, 943
Hematology: See Blood Hemopoietic System
Hematoma; Ehlers-Danlos syndrome; 2 cases, 622
Subdural: See Meninges, hemorrhage
subperiosteal, in scurvy (Moeller-Barlow disease), 283
Hemihypertrophy: See Hypertrophy
Hemoglobin and Hemoglobin Compounds: See Anemia; Blood; etc.
Hemolysis: See Erythroblastosis, Fetal; Jaundice; Streptococci
Hemophilia; action of intravenous injections of histamine on blood of hemophilic children, 139
Hemophilus: See Bacteria; Influenza; Whooping Cough
Hemopoietic System: See also Leukocytes
Diseases: See Anemia; Erythroblastosis, Fetal; Leukemia; etc.
nitrogen mustard therapy; studies on effect of methyl-bis (beta-chloroethyl)amine hydrochloride on neoplastic diseases and allied disorders of hemopoietic system, 956
Hemorrhage: See also Encephalitis; Hemophilia; Meninges; Purpura; Rectum; etc.
cause and significance of seasonal variation in hemorrhagic tendency in newborn, 931
prothrombin studies on blood of premature infant and value of vitamin K therapy, *686
Henoch's Purpura: See Purpura
Heparin; immunologic studies in patients with subacute bacterial endocarditis treated by combined penicillin-heparin method; report of sensitivity to heparin in patient, 943
Hepatitis: See also Jaundice; Liver
Heredity: See also Antigens and Antibodies; Blood, groups; etc.
hereditary factors in infantile progressive muscular atrophy; study of 112 cases in 70 families, *226
in infantile type of Gaucher's disease; report of case, *694
Hermaphroditism; operative intervention in hermaphrodite, 615
Herpes; herpetic angina in suckling, 612
Herter-Gee Disease: See Celiac Disease
Herxheimer Reaction: See Syphilis
Hinton Test: See Syphilis
Hirschsprung's Disease: See Colon, dilatation
Histamine: See also Anaphylaxis and Allergy
action of intravenous injections on blood of hemophilic children, 139
Histoplasmin: See Histoplasmosis
Histoplasmosis; histoplasmin patch test, *65
Hodgkin's Disease; nitrogen mustard therapy; studies on effect of methyl-bis (beta-chloroethyl)amine hydrochloride on neoplastic diseases and allied disorders of hemopoietic system, 956
nitrogen mustard therapy; use of methyl-bis (beta-chloroethyl)amine hydrochloride and tris (beta-chloroethyl)amine hydrochloride for Hodgkin's disease, lymphosarcoma, leukemia and certain allied and miscellaneous disorders, 955
Hoffmann-Werdnig Paralysis: See Atrophy, muscular
Holinger, P. H.: Congenital anomalies of esophagus related to esophageal foreign bodies, *467
Holmes, A. D.: Comparison of stability of reduced ascorbic acid in raw and pasteurized milk, *899
Hopkins, L. A.: Rubella-deafened infants; comparison of group of rubella-deafened children with group of hereditarily deaf children and their sibs, *182
Hormones: See also Endocrine Glands; Insulin; and under names of organs
Adrenotropic: See Pituitary Body
effects of castration and treatment with sex steroids on synthesis of serum cholinesterase in rat, 798
Estrogenic: See Estrogens
sex; effects of various hormonal conditions in intact rat on synthesis of serum cholinesterase, 616
Hospitals; acute respiratory disorders among newborn infants in obstetric nurseries; experience in New York city, 1940 to 1948, *883
appendicitis; review of 936 cases at Cincinnati General Hospital, 793
brief report on sampling of certain opinions of local pediatricians, 815

Hospitals—Continued
diphtheria in pediatric clinic of Florence, Italy, 1941 to 1943, 454
measures for protection of newborn infants; description of measures instituted in May 1937 at Long Island College Hospital; practical experiences with prophylaxis of diarrhea; management of diarrhea epidemic, 121
physical requirements of rooming-in plan, 929
present state of children's hospitals and departments in Prague, Bohemia and Moravia, 294
spread of diarrhea of unknown origin in ward for infants, *217
standardized plan of treatment for gastroenteritis in infants, 948
wards for newborn infants, 606
Hydatid Cyst: See Echinococcosis
Hydramnion: See Amnion, dropsy of
Hydrocephalus; toxoplasmosis in children, 940
Hydrogen Ion Concentration: See also Acid-Base Equilibrium; Cerebrospinal Fluid; Feces; etc.
pH of mouth in newborn infant, 930
Hydrophobia: See Rabies
Hydrophthalmos; report on case of hydrophthalmia (buphthalmos) 619
Hydrops: See Dropsy
Hydrostreptomycin: See Streptomycin
Hygiene and Sanitation: See also Health; Mental Hygiene; etc.
school hygiene organization in Sweden, 927
Hypercalcemia: See under Calcium and Calcium Compounds
Hyperergy: See Anaphylaxis and Allergy
Hypergenitalism: See Puberty
Hyperglycemia: See Blood, sugar; Diabetes Mellitus
Hyperlipemia: See Blood, fats and lipoids
Hyperproteinemia: See Blood, proteins
Hyperpyrexia: See Fever
Hyperthermia: See Fever
Hypertrophy: See also under names of organs and regions, as Heart; etc.
hemihypertrophy; 5 cases, 928
Hypocalcemia: See Blood, calcium
Hypogenitalism: See Laurence-Moon-Biedl Syndrome
Hypoglycemia: See Blood, sugar; Diabetes Mellitus
Hypophysis: See Pituitary Body
Hypoproteinemia: See Blood, proteins
Hypoprothrombinemia: See Blood, prothrombin
Hypothalamus: See also Pituitary Body
atrophy; histologic aspects of late sequela of kernicterus, 122
Hypothyroidism: See under Thyroid
Hypoxia: See Oxygen, deficiency

Ichthyosis treated with stilbestrol, 803
Icterus: See Erythroblastosis, Fetal; Jaundice
Idiocy: See also Feeblemindedness
mongolian; mongolism in 1 of twins and in another sibling; report of case, *573
Mongolian; mongolism; objective early sign (palmar dermatoglyphics), 131
Idiosyncracy: See Anaphylaxis and Allergy
Ileum: See Intestines
Ileus: See Intestines
Imbecility: See Feeblemindedness
Immunity: See also under Anaphylaxis and Allergy; Antigens and Antibodies; Diphtheria; Parotitis; etc.
comparative effect of penicillin and sulfonamide drugs on immune response of rabbits to pneumococcus infection and relation of immunity to bacterial chemotherapy, 288
Immunity; medical progress; active immunization, 287
reticuloendothelial function before and after birth, 609
Impetigo; acute nephritis in childhood, 293
bacteriologic and epidemiologic studies on pemphigus neonatorum and its treatment, 786
Inanition: See Nutrition
Infant Feeding: See also Diet and Dietetics; Nutrition; Vitamins; and under names of various foods, as Milk; etc.
breast feeding, 776
breast feeding from obstetrical point of view, 282
brief report on sampling of certain opinions of local pediatricians, 815
composition of human colostrum and milk, *589
cup feeding of newborn infants, 785
effects of cup, bottle and breast feeding on oral activities of newborn infants, 928
meat juice in, 449
wards for newborn infants, 606
Infant Mortality: See also Newborn Infants; Premature Infants
demographic study of mortality due to prematurity and congenital weakness in Buenos Aires, Argentina, 1937 to 1941, 783
in first 2 years of life in community of Fermo and in orphanage, 1938 to 1940 and 1944 to 1946, 120
in Slovakia, 786
infant and childhood morbidity in Salzburg following war, 284
our high rates, 284
report of Joint Maternal Welfare Committee of Cook County, 134
Infant Welfare: See also Child Welfare
anticipatory guidance of pregnant woman and her husband for their roles as parents, 465
cornelian corner and its rationale, 465
outlines for well baby clinics; recording development of second 12 months, 780
wards for newborn infants, 606
Infantile Paralysis: See Poliomyelitis
Infantilism, Intestinal: See Celiac Disease
Pituitary: See under Pituitary Body
Renal: See Dwarfism
Splenic: See Splenomegaly
Infants: See also Children; Infant Feeding; Infant Mortality; Infant Welfare; Newborn Infants; Pediatrics; Premature Infants; etc.
Diseases: See under names of various diseases
Growth: See Growth
mediastinal lymphosarcoma in child 4 months of age, 947
Newborn: See Newborn Infants
tricuspid atresia; report of 2 cases of young infants, with successful operation, *16
Infection: See also Immunity; Septicemia; and under names of bacteria, organs and regions, as Staphylococci; Streptococci; etc.
anemia of; uptake of radioactive iron in iron-deficient and in pyridoxine-deficient pigs before and after acute inflammation, 943
Infectious Diseases: See Communicable Diseases; Diphtheria; Infection; Pneumococci; Typhoid; etc.
Inflammation: See Abscess; Infection
Influenza A, outbreak in boys' school, 607
medical progress; active immunization, 287
morphologic characteristics and antibiotic resistance of Hemophilus influenzae, *659
present treatment of influenzal meningitis; review of literature and report on 22 patients treated with streptomycin and sulfadiazine, *97
reactions to influenza virus vaccine in infants and children, *295
treatment of influenzal meningitis, 795
treatment of meningitis due to Haemophilus influenzae with streptomycin, 461
Infusions: See Blood transfusion; Injections
Iniencephalus: See under Monsters

Injections: See also Blood, transfusion; Insulin; etc.
complications of intrathecal use of penicillin, 291
intramuscular; sterile abscess in both buttocks secondary to injection of penicillin in sesame oil, *387
subcutaneous; maintenance of therapeutic blood concentrations of penicillin for 24 hours following single injections of penicillin-beeswax-peanut oil mixtures, 294
Injuries: See under Birth injuries; Newborn Infants; and under names of organs and regions
Inpatient Service: See Hospitals
Insensible Perspiration: See Metabolism
Institutions: See also Child Welfare; Feeblemindedness; Hospitals; Schools; etc.
mortality in first 2 years of life in community of Fermo and in orphanage, 1938 to 1940 and 1944 to 1946, 120
socioemotional factors accounting for growth failure in children living in, 780
Instruments: See Apparatus
Insulin: See also Diabetes Mellitus
variations in blood phosphorus levels (inorganic, lipid and total) in 3 cases of progressive muscular dystrophy after insulin stimulation, 800
Intelligence Tests: See Mental Tests
Internal Secretions: See Endocrine Glands
Intestines: See also Colon; Gastrointestinal Tract; Rectum
diverticula; patent omphalomesenteric duct and its relation to diverticulum of Meckel, 794
epithelioma in 10 year old girl, 948
multiple calcareous deposits in intestinal tract of newborn; report of case associated with stenosis of ileum, *393
typhoid masked by measles; perforation of intestine with recovery, *744
Intoxication: See Toxemia
Iodine and Iodine Compounds; effect of thyroid hormone and iodine on carotenoids of blood, 120
Therapy: See Tinea capitis
Iron; anemia of infection; uptake of radioactive iron in iron-deficient and in pyridoxine-deficient pigs before and after acute inflammation, 943
Therapy: See Anemia
Irradiation: See Radium; Roentgen Rays; etc.
Islands of Langerhans: See Pancreas
Isotopes, Radioactive: See Radioactivity
Israels, S.: Nephrolithiasis with renal tubular failure, *389

Jackson, I. J.: Subdural hematoma and effusion in infants; review of 55 cases, *635
von Jaksch-Hayem-Luzet Disease: See Anemia, erythroblastic
Japanese Occupation: See War
Jaundice: See also Erythroblastosis, Fetal
nuclear, cause in neonatal sepsis with jaundice, 930
Jaworski, R. A.: Postvaccination encephalitis; problem in differential diagnosis, *248
Jaws; mandibular growth disturbance in rheumatoid arthritis of childhood, *728
deformities; stimulation of mandibular growth in congenital micrognathia by traction, *750
underdevelopment of mandible as side effect of irradiation therapy, 927
Jejunum: See Intestines
Johnson, S. H., III: Hypertrophy of colliculus seminalis in childhood; report of 18 cases, *892
Johnston, K. C.: Congenital anomalies of esophagus related to esophageal foreign bodies, *467
Joints: See also under names of individual joints
ankylosis; arachnodactyly with amyoplasia congenita, 453
Joints—Continued
Diseases: See Arthritis; Rheumatism; etc.
Ehlers-Danlos syndrome; 2 cases, 622
Jones, J. P.: Present treatment of influenzal meningitis; review of literature and report on 22 patients treated with streptomycin and sulfadiazine, *97
Journals: See Periodicals

Kagan, B. M.: Chorea (Sydenham); study of 58 additional patients, *306
Penicillin in pediatrics, 808
Kahn Test: See Syphilis
Kala-Azar: See Leishmaniasis
Kaplan, S. R.: Further studies on use of streptomycin in treatment of whooping cough, *212
Kennedy, R. L. J.: Chronic relapsing pancreatitis and hyperlipemia, *80
Kennedy, S. R., Jr.: Action of intravenous injections of histamine on blood of hemophilic children, 139
Kenny, Elizabeth, Institute, appointments announced at, 818
Kenny Treatment: See Poliomyelitis
Keratoderma: See Ichthyosis
Keratomalacia: See Cornea, softening
Kernicterus: See Erythroblastosis, Fetal; Jaundice
Ketosteroids: See Steroids
Kidneys: See also Urinary Tract
calculi; nephrolithiasis with renal tubular failure, *389
Carbuncle: See Nephritis
Diseases: See also Nephritis; Pyelonephritis
diseases; urinary glycocyamine, creatine and creatinine; their excretion in children with nephrotic syndrome, *67
embryonal carcinosarcoma of kidney (Wilms's tumors), 954
influence of postnatal age on kidney function of premature infants, 782
leiomyoma of, 797
peritoneal irrigation; method of treatment of acute renal failure in infant, *237
renal threshold for ascorbic acid; modified method for its estimation with results for 12 adult subjects, 449
Kilham, L.: Mumps meningoencephalitis with and without parotitis, *324
Kindergarten: See Schools
Kinzer, L. G.: Rubella-deafened infants; comparison of group of rubella-deafened children with group of hereditarily deaf children and their sibs, *182
Klebsiella: See Bacteria
Kline Test: See under Syphilis
Koch's Bacillus: See Tubercle Bacilli
Kohn, J. L.: Further studies on use of streptomycin in treatment of whooping cough, *212
Streptomycin in treatment of whooping cough, *201
Kostalik, M.: Prothrombin studies on blood of premature infant and value of vitamin K therapy, *686
Kramer, B.: End results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
Vitamin A absorption in newborn, date of receipt of paper, 280
Krasnoff, S. O.: Acute acetylsalicylic acid intoxication; report of 5 cases with 2 deaths, *477
Kristan, J. J.: Thrombopenic purpura in newborn; review of literature and report of 6 cases, *401
Kyphosis: See Spine, curvature

LaBoccetta, A. C.: Measles encephalitis; study of 50 cases, *844
Scarlet fever; diagnostic value of Dick test, white blood cell counts, throat cultures and desquamation, *314
Labor: See also Obstetrics; Placenta; Pregnancy; Puerperium; etc.

Labor—Continued
dicephalic monster complicating labor (fetal dystocia), 453
Laboratories; BCG vaccination, 280
laboratory infection with psittacosis virus treated with penicillin and sulfadiazine and experimental data bearing on mode of infection, 288
typhoid fever in vaccinated laboratory workers, 289
Lactalbumin: See Albumin
Lactation: See also Colostrum; Infant Feeding; Milk
and reproduction studies with rats fed natural and purified rations, 922
metabolism of women during reproductive cycle; effect of multi-vitamin supplements on vitamin C utilization of nursing mothers, 450
metabolism of women during reproductive cycle; vitamin C in diets, breast milk, blood and urine of nursing mothers, 450
Lactoflavin: See Riboflavin
Lambert, E. C.: Peritoneal irrigation; method of treatment of acute renal failure in infant, *237
Lambliasis; avitaminosis A in giardiasis, *257
giardiasis associated with recurrent rectal hemorrhages, 938
Láncos, F. J.: Avitaminosis A in giardiasis, *257
Lander, H. B.: Effects of measles on nephrotic syndrome, 813
Langerhans' Islands: See under Pancreas
Larynx; bronchopulmonary moniliasis with laryngeal involvement, 793
laryngeal diphtheria and other infections, 122
Laurence-Moon-Biedl Syndrome, early ocular manifestations in, 133
Leichenger, H.: Streptomycin in treatment of whooping cough, 810
Leiomyoma of kidney, 797
Leishmaniasis; bone marrow in visceral leishmaniasis in children, 124
kala-azar in infancy, 938
Lennox, M. A.: Febrile convulsions in childhood; clinical and electroencephalographic study, *868
Lens, Crystalline; light reflexes associated with spherophakia, 620
spontaneous rupture of lens capsule in anterior lenticonus, 618
Lenticonus: See Lens, Crystalline
Leprosy in childhood in Santiago, Cuba, 941
Leukemia in children; effect of intravenous serum therapy, 125
nitrogen mustard therapy; use of methyl-bis (beta-chloroethyl)amine hydrochloride and tris (beta-chloroethyl)amine hydrochloride for Hodgkin's disease, lymphosarcoma, leukemia and certain allied and miscellaneous disorders, 955
radioactive phosphorus as therapeutic agent; review of literature and analysis of results of treatment of 155 patients with various blood dyscrasias, lymphomas and other malignant neoplastic diseases, 294
treatment in children, 137
Leukocytes: See also under Blood; Leukemia; Lymphocytes; etc.
count; scarlet fever; diagnostic value of Dick test, white blood cell counts, throat cultures and desquamation, *314
disseminated visceral lesions associated with extreme eosinophilia; pathologic and clinical observations on syndrome of young children, *153
leukocytic formula in newborn in relation to that in mother and endocrinology of gestation, 286
Leukocytosis: See Leukocytes, count
Light; cumulative effect of sunlight as compared with seasonal variation of rickets and tetany, 925
Lip Reading: See Deafness
Lipman, B. L.: Acute acetylsalicylic acid intoxication; report of 5 cases with 2 deaths, *477
Lipoids: See Blood, fats and lipoids; Fat; Phosphorus and Phosphorus Compounds
Lips, Harelip: See Harelip
Literature: See Books; Periodicals
Lithiasis: See Kidneys, calculi; Ureters, calculi; etc.
Liver; chronic sclerosing hepatitis; report of 2 cases of children, 795
disseminated visceral lesions associated with extreme eosinophilia; pathologic and clinical observations on syndrome of young children, *153
effect of thiouracil on succinoxidase and cytochrome oxidase of rat liver, 616
hemangioendothelioma in infant 25 days of age, 950
value of biopsy of liver in nutritional dystrophy; evaluation of treatment with choline and dried stomach, *141
Löffler's Bacillus: See Diphtheria
Longmire, W. P., Jr.: Stimulation of mandibular growth in congenital micrognathia by traction, *750
Lordosis: See Spine, curvature
Lowe, C. U.: Fibrosis of pancreas in infants and children; statistical study of clinical and hereditary features, *349
Lückenschädel: See Cranium
Lues: See Syphilis
Lumbar Puncture: See Spinal Puncture
Lungs: See also Bronchi; Respiration; Respiratory Tract; etc.
Blood Supply: See Arteries, pulmonary; etc.
chronic emphysematous cavity of, *755
Collapse: See also Pneumothorax
collapse; massive atelactasis following tonsillectomy under local anesthesia; report of case, 610
congenital alveolar dysplasia; developmental anomaly involving pulmonary alveoli, 781
Diseases: See Tuberculosis, pulmonary; etc.
disseminated visceral lesions associated with extreme eosinophilia; pathologic and clinical observations on syndrome of young children, *153
pulmonary hydatid cyst with asthma, 612
Tuberculosis: See Tuberculosis, pulmonary
Luzet-Hayem-von Jaksch Disease: See Anemia, erythroblastic
Lymphocytes: See also Leukemia; Leukocytes
in Meningitis: See Choriomeningitis
pituitary-adrenal cortical control of lymphocyte structure and function as revealed by experimental x-radiation, 798
Lymphoma; nitrogen mustards in treatment of neoplastic disease; official statement, 955
radioactive phosphorus as therapeutic agent; review of literature and analysis of results of treatment of 155 patients with various blood dyscrasias, lymphomas and other malignant neoplastic diseases, 294
Lymphosarcoma, mediastinal, in child 4 months of age, 947
nitrogen mustard therapy; use of methyl-bis (beta-chloroethyl)amine hydrochloride and tris (beta-chloroethyl) amine hydrochloride for Hodgkin's disease, lymphosarcoma, leukemia and certain allied and miscellaneous disorders, 955
Lysine; effect of cooking and curing on lysine content of pork luncheon meat, 281

McAlenney, P. F.: Thrombopenic purpura in newborn; review of literature and report of 6 cases, *401
McEnery, E. T.: Streptomycin used in treatment of pulmonary tuberculosis in children, 805
McGarry, M.: Morphologic characteristics and antibiotic resistance of Hemophilus influenzae, *659
McIntosh, R., election to Medical Board of Presbyterian Hospital, New York, 604
Mack, J. K.: Drainage of pulmonary veins into coronary sinus, *906

Macrogenitosomia: See Puberty, precocious
Macula Lutea; genetic relationships between spinal hereditary sclerosis (Friedreich's ataxia) and various forms of tapetoretinal degeneration, 614
Macy, I. G.: Composition of human colostrum and milk, *589
Maitland, B. A.: Peritoneal irrigation; method of treatment of acute renal failure in infant, *237
Malaria, chronic, adrenal cortical hypofunction (Addison's disease) in, 124
Malformations: See Abnormalities and Deformities; Monsters; and under names of organs and regions
Malnutrition: See under Dystrophy; Nutrition
Mandible: See Jaws
Mantoux Reaction: See Tuberculosis
Marfan's Syndrome: See Arachnodactyly
Marino, J. J.: Tricuspid atresia; report of 2 cases of young infants, with successful operation, *16
Marsh, H. F.: Unusual strain of Pseudomonas aeruginosa, *252
Masculinization: See Hermaphroditism
Mastoid, Inflammation: See Mastoiditis
Mastoiditis: See also Otitis Media
puncture and surgical opening of antrum in infants, 612
roentgenologic diagnosis in infants and children, 946
Maternity: See also Labor; Obstetrics; Pregnancy; Puerperium
welfare; report of Joint Maternal Welfare Committee of Cook County, 134
Mathematics; reading and arithmetic abilities associated with speech defects, 465
Matheson, A.: Epidermolysis bullosa, *708, 812
Maxilla: See Jaws
Maxillary Sinus; puncture and surgical opening of antrum in infants, 612
May, C. D.: Fibrosis of pancreas in infants and children; statistical study of clinical and hereditary features, *349
Mead Johnson fellows, 917
Measles; effects on nephrotic syndrome, 813
encephalitis; study of 50 cases, *844
German: See Rubella
in kindergarten, 123
pseudoinhibition as result of parallergic reaction in, 455
typhoid masked by; perforation of intestine with recovery, *744
Meat: See also Pork
calcium enriched meat compared with milk as source of calcium, phosphorus and protein, 282
juice in feeding of infants, 449
Meckel's Diverticulum: See under Intestines
Mediastinum, bronchiogenic cysts of, 136
esophageal foreign body with mediastinitis and other complications, 794
fatal interstitial and mediastinal emphysema following accidental needle perforations of trachea during jugular venipuncture, *375
lymphosarcoma in child 4 months of age, 947
pleurisy, 127
Medical Research Council; trial of whooping cough vaccine in city and residential nursery groups; report to Medical Research Council, 933
Medical Societies: See Societies
Medicine, Military: See Military Medicine
Psychosomatic: See Mind, body and mind
Medin-Heine Disease: See Poliomyelitis
Mediterranean Anemia: See Anemia, erythroblastic
Megacolon: See Colon, dilatation
Meneghello, J.: Value of biopsy of liver in nutritional dystrophy; evaluation of treatment with choline and dried stomach, *141
Meninges, hemorrhage, subarachnoid, in 10 year old boy, 464
Meninges—Continued
hemorrhage; subdural hematoma and effusion in infants; review of 55 cases, *635
tuberculosis; treatment of tuberculous meningitis with streptomycin, sulfones and vitamin A, 457
tuberculosis; tuberculous meningitis treated with streptomycin; report of 2 cases, 125
Meningitis: See also Choriomeningitis; Meningoencephalitis
acute benign, epidemic of, 951
acute, complex metabolic syndrome in newborn infant with, 932
cerebrospinal diagnosis of, 464
due to Haemophilus influenzae; treatment with streptomycin, 461
influenzal, present treatment; review of literature and report on 22 patients treated with streptomycin and sulfadiazine, *97
influenzal, treatment of, 795
intracranial hemorrhage and aseptic purulent meningitis in newborn infants, *384
Lymphocytic: See Choriomeningitis
morphologic characteristics and antibiotic resistance of Hemophilus influenzae, *659
pneumococcic, successfully treated with sulfonamide compounds and penicillin, 292
pneumococcic; treatment with combined penicillin and sulfonamide therapy, 951
"relapsing" and "recurring," 130
transfer of penicillin into cerebrospinal fluid following parenteral administration, 129
Tuberculous: See Meninges, tuberculosis
unusual strain of Pseudomonas aeruginosa, *252
Meningococci: See under Meningitis
Meningoencephalitis: See also Encephalitis; Meningitis
mumps meningoencephalitis with and without parotitis, *324
Meningoradiculitis: See Nerves, roots
Mental Deficiency: See Feeblemindedness
Mental Diseases: See Dementia Precox; Feeblemindedness; Mental Hygiene; Nervous and Mental Disabilities; Psychiatry; etc.
Mental Hygiene; child guidance, 615
mental aspects of growth and health, 796
Mental Tests; end results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
variation in intelligence quotient in 10 mentally deficient children under pedagogic plan, 131
Metabolism: See also under specific headings, as Water; etc.
complex metabolic syndrome in newborn infant with acute meningitis, 932
of women during reproductive cycle; effect of multi-vitamin supplements on vitamin C utilization of nursing mothers, 450
of women during reproductive cycle; vitamin C in diets, breast milk, blood and urine of nursing mothers, 450
work performance, respiratory exchange and certain blood constituents after isocaloric meals of low and high carbohydrate content, 281
Meteorology: See Seasons
Methemoglobinemia, cyanosis caused by, *77
two cases in infants, 125
Michelson, J. P.: End results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
Micrognathia: See Jaws, deformities
Microsporon audouini, tinea capitis due to; methods of local therapy, 620
Micturition: See Urination
Midget: See Dwarfism
Military Medicine; Dick test in military personnel, 286

Military Medicine—Continued
epidemic encephalitis in military personnel; isolation of Japanese B virus on Okinawa in 1945, serologic diagnosis, clinical manifestations, epidemiologic aspects and uses of mouse brain vaccine, 614
Milk: See also Infant Feeding
calcium enriched meat compared with milk as source of calcium phosphorus and protein, 282
chemical composition of Egyptian buffalo's milk and its relation to milk laws, 776
comparison of stability of reduced ascorbic acid in raw and pasteurized milk, *899
effect of mixed tocopherols on milk and butterfat production of dairy cow, 923
Human: See also Infant Feeding; Lactation
human; composition of human colostrum and milk, *589
human; metabolism of women during reproductive cycle; vitamin C in diets, breast milk, blood and urine of nursing mothers, 450
placental and mammary transfer of tocopherols (vitamin E) in sheep, goats and swine, 923
surface tension of, 777
Miller, J. H.: Cardiac enlargement in uncomplicated mitral insufficiency in children, *703
Mind, body and mind; somatic substitute reactions in adolescents, 953
Diseases: See Dementia Precox; etc.
Mineral Oil: See Petrolatum, liquid
Minuse, E.: Reactions to influenza virus vaccine in infants and children, *295
Mitral Valve; cardiac enlargement in uncomplicated mitral insufficiency in children, *703
Moeller-Barlow Disease: See Scurvy
Mongolism: See Idiocy, mongolian
Moniliasis, bronchopulmonary, with laryngeal involvement, 793
Monsters: See also Teratoma
brain in case of human cyclopia, 781
dicephalic, complicating labor, 453
iniencephalus, 782
Moon-Laurence-Biedl Syndrome: See Laurence-Moon-Biedl Syndrome
Morbidity: See Vital Statistics
Morbus Cushing: See Cushing Syndrome
Morquio's Diseases: See Dychondroplasia
Mortality Statistics: See Infant Mortality; Newborn Infants; Vital Statistics; etc.
Mosquitoes: See Malaria
Mossberger, J. I.: Anoxia of central nervous system and congenital heart disease; report of 3 cases with note on history of asphyxia, *28
Mothers: See Maternity; Pregnancy; etc.
Motion Pictures: See Moving Pictures
Mouth: See also Gums; Stomatitis; etc.
effects of cup, bottle and breast feeding on oral activities of newborn infants, 928
Inflammation: See Stomatitis
p_H of mouth in newborn infant, 930
Movements, Fetal: See Fetus
Moving Pictures; revised edition of booklet of motion picture reviews now available, 466
Mumps: See Parotitis
Muscles, abnormalities; arachnodactyly with amyoplasia congenita, 453
Atrophy: See Atrophy, muscular
diagnostic value of elementary electromyography in pediatrics, 804
Dystrophy: See Dystrophy
Paralysis: See Paralysis
Tonus: See Myatonia
Muth, H.: Nephrolithiasis with renal tubular failure, *389
Myatonia congenita; congenital and infantile amyotonia, 954
Myeloplaxoma of cervical vertebrae in 2½ year old child treated by roentgen therapy, 800
Myelosis: See Bones, marrow
Aleukemic: See Leukemia
Aplastic: See Anemia, aplastic
Myocardium: See Heart
Myopathy: See under Muscles
Nails; neuropsychologic aspects of onychophagy in children, 131
Nanism: See Dwarfism
Narcoses: See Anesthesia
Nausea: See Vomiting
Neck, infection after tonsillectomy, 944
Negri Body: See Rabies
Negroes; congenital deformities of forearm, 453
hemolytic disease of newborn in South African natives, 931
Nematodes: See Oxyuriasis; etc.
Neoplasms: See Cancer; Tumors; etc.
Nephritis: See also Kidneys; Pyelonephritis; etc.
acute, in childhood, 293
blood transfusions in, 293
effects of measles on nephrotic syndrome, 813
plasma volume in, 797
Nephrolithiasis: See Kidneys, calculi
Nephrosis: See Kidneys, diseases; Nephritis
Nerves: See also Nervous System; Paralysis
optic; spongioblastoma of optic chiasm in infant, 801
optic; unpigmented primary tumor of optic disk, 619
roots; meningoradiculitis and syndrome of Guillain-Barré and Strohl, 291
splanchnic, infiltration, and vomiting in infants, 949
vagus; evaluation of vagotomy in chronic nonspecific ulcerative colitis, 948
Nervous and Mental Disabilities: See also Chorea; Dementia Precox; Encephalitis; Feeblemindedness; Idiocy; Mental Hygiene; etc.
child guidance, 615
diantin (diphenylhydantoin sodium) treatment for behavior problem children with abnormal electroencephalograms, 465
end results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
neuropsychologic aspects of onychophagy in children, 131
play diagnosis, 953
play therapy, 953
psychologic appraisal of children with neurologic defects, 796
Nervous System: See also Brain; Nerves; Reflex; etc.
anoxia of central nervous system and congenital heart disease; report of 3 cases with note on history of asphyxia, *28
blood redox reaction as test for vegetative nervous function, 464
carbonic anhydrase in central nervous system of developing fetus, 780
Diseases: See also Epilepsy; etc.
diseases; topographic distribution of lesions in central nervous system in Japanese B encephalitis; nature of lesions, with report of case on Okinawa, 613
etiologic analysis of cases of "pertussis brain," 456
histopathologic changes associated with human poliomyelitis, 454
parasympathetic factor in megacolon, 795
reaction of children to autonomic drugs, 956
Syphilis: See Neurosyphilis
Neuroblastoma of retina, 802
Neurohypophysis: See Pituitary Body
Neuroses and Psychoneuroses: See Nervous and Mental Disabilities
Neurosyphilis; transfer of penicillin into spinal fluid following parenteral administration, 129
Neutrophils: See Leukocytes
New York City; place in American linguistic geography, 611
Newborn Infants: See also under names of diseases, as Anemia; Asphyxia; Cyanosis; Impetigo; Jaundice; Meningitis; Pneumothorax; Syphilis; Tetany; etc.
acute respiratory disorders among newborn infants in obstetric nurseries; experience in New York city, 1940 to 1948, *883

Newborn Infants—Continued
association of maternal polyhydramnios with congenital atresia of upper alimentary tract in newborn, 134
BCG vaccination of, 941
cause and significance of seasonal variation in hemorrhagic tendency in, 931
cause of nuclear jaundice in neonatal sepsis with jaundice, 930
comparison of weight 85 years ago and today, 606
complex metabolic syndrome with acute meningitis, 932
cup feeding of, 785
effects of cup, bottle and breast feeding on oral activities of, 928
enterococci in infectious diarrhea of, 786
fracture of clavicle in, 932
genital malformation in; report of case, 616
hemolytic disease of, 930
hemolytic disease of; 2 rare cases, 785
pH of mouth in, 930
hypocalcemia in neonatal period; clinical study, *537
intracranial hemorrhage and aseptic purulent meningitis in, *384
leukocytic formula in newborn in relation to that in mother and endocrinology of gestation, 286
measures for protection of; description of measures instituted in May 1937 at Long Island College Hospital; practical experiences with prophylaxis of diarrhea; management of diarrhea epidemic, 121
multiple calcareous deposits in intestinal tract of; report of case associated with stenosis of ileum, *393
osteomyelitis of, 929
otitis media in, 122
penicillin in treatment of neonatal sepsis, 122
reticuloendothelial function before and after birth, 609
septicemia of, 931
significance of positive blood cultures in, 783
significance of Weltmann and Takata-Ara reactions in blood serum of, 454
spontaneous pleural effusion in, *569
spread of diarrhea of unknown origin in ward for infants, *217
thrombopenic purpura in; review of literature and report of 6 cases, *401
toxic, care of, 784
transfusions through abdominal wall segment of umbilical vein, 783
viral studies on etiology of epidemic diarrhea of, 794
vitamin A absorption in; date of receipt of paper, 280
wards for, 606
Niacin: See Nicotinic Acid
Nicotinic Acid: See also Vitamins, B
effect on blood lipids of normal infants, 283
effect on vaccination, 123
nicotinamide and phosphorus in blood, 452
Nitrates; cyanosis caused by methemoglobinemia, *77
methemoglobinemia; 2 cases in infants, 125
Nitrogen Mustards: See Chloroethylamines
Nitrophenylhydrazine: See Stains and Staining
Nodes: See Rheumatic Fever
Nucleus Pulposus: See Spine
Nurseries: See Child Welfare; Hospitals; Infant Welfare; Institutions
Nutrition: See also Diet and Dietetics; Dystrophy; Infant Feeding; Metabolism; Vitamins; etc.
abnormal water metabolism in malnutrition, 449
acute adrenal insufficiency in infancy, 292
comparative nutritive value of casein and lactalbumin for man, 282
dwarfism in healthy children; its possible relation to emotional, nutritional and endocrine disturbances, 776
Nutrition—Continued
subacute subnutritional syndrome in infants, 777
value of biopsy of liver in nutritional dystrophy; evaluation of treatment with choline and dried stomach, *141
volume of extracellular body fluids in malnutrition, 924
Nycturia: See Urination, incontinence

Obituaries:

Jemma, Rocco, 605
Tisdall, Frederick F., 919

Obstetrics: See also Hospitals; Labor; Maternity; Pregnancy; etc.
breast feeding from obstetrical point of view, 282
Oil, Mineral: See Petrolatum, liquid
Peanut: See under Penicillin
Sesame: See Sesame Oil
Okayasu, K.: Intracranial hemorrhage and aseptic purulent meningitis in newborn infants, *384
Oligophrenia: See Feeblemindedness
Oliguria: See Urination
Ollier's Disease: See Dyschondroplasia
Ombrédanne's Disease: See Cranium
Omphalomesenteric Duct: See Vitelline Duct
Onychophagy: See Nails
Ophthalmia neonatorum, local penicillin therapy in, 785
Oppenheim's Disease: See Myatonia congenita
Optic Chiasm, spongioblastoma in infant, 801
Orbit; anatomic study of complex retrobulbar embryonic malformation, 619
Oriental Sore: See Leishmaniasis
Orthodontics: See Teeth
Orthopedics: See Exercise; Poliomyelitis
Os Pubis: See Pubic Bone
Osteochondritis, syphilitic, simulating osteomyelitis, 617
Osteochondrodystrophy: See Dyschondroplasia
Osteogenesis: See Bones, growth
Imperfecta: See Bones, fragility
Osteomyelitis, acute primary hematogenous, of os pubis, treated and cured with penicillin, 800
acute, treated by penicillin, 800
in infancy, 617
of newborn, 929
simulating syphilitic osteochondritis, 617
Otitis Externa: See Ear, external
Otitis Media: See also Mastoiditis
aural diseases of infants, 791
in newborn, 122
local use of penicillin in alcohol and glycerin for chronically running ears, 610
otogenic brain abscess, 791
otogenous tetanus, 124
treatment of acute diseases of middle ear with sulfonamide compounds, 945
treatment of stubborn otitis of infancy by local instillations of penicillin, 944
Ovary, twisted cyst in infant, 293
Oxidase and Peroxidase; effect of thiouracil on succinoxidase and cytochrome oxidase of rat liver, 616
Oxidation-Reduction; effects of autoxidation on antiacrodynic potency of fats and linoleic esters, 775
Oxycephaly: See Acrocephaly
Oxygen: See also Respiration
deficiency; anoxia neonatorum, 285
deficiency; anoxia of central nervous system and congenital heart disease; report of 3 cases with note on history of asphyxia, *28
Oxyuriasis; diagnosis of enterobiasis, 787

Palate, cleft; arachnodactyly; review of recent literature and report of case with cleft palate, *417
cleft; "open" endotracheal method of anesthesia for harelip and cleft palate operations in infants, 121
cleft; rationale of blowing exercises for patients with repaired cleft palates, 452

Palate—Continued
cleft, relationship between maternal ancestry and incidence of 285
cleft; velopharyngeal exercise, 285
Palsy: See Paralysis
Pancreas, cystic fibrosis; 3 cases, 795
fibrocystic disease, 612, 613
fibrosis in infants and children; statistical study of clinical and hereditary features, *349
Inflammation: See Pancreatitis
Pancreatitis, chronic relapsing, and hyperlipemia, *80
Pantothenic Acid: See Vitamins, B.
Paralysis: See also Poliomyelitis; etc.
Bell's: See Paralysis, facial
brain in infantile cerebral palsy, 129
cerebral; environmental factors in relation to speech of cerebral palsied children, 952
facial, congenital, 613
Infantile: See Poliomyelitis
progressive bulbar, and its relation to chronic poliomyelitis and amyotrophic lateral sclerosis, 935
Werdnig-Hoffmann: See Atrophy, muscular
Paranoia: See Dementia Precox
Pararrhythmia: See Arrhythmia
Parasites: See under names of parasitic diseases, as Oxyuriasis; etc.
Parents; anticipatory guidance of pregnant woman and her husband for their roles as parents, 465
sex differences in relation to stuttering, 460
Parotitis, allergic, 947
gelatinous edema; pathognomonic sign in mumps, *903
mumps meningoencephalitis with and without parotitis, *324
Parturition: See Labor
Pasteurization: See Milk
Patch Test: See Anaphylaxis and Allergy; Tuberculosis
Peale, A. R.: Measles encephalitis; study of 50 cases, *844
Peanut Oil: See under Penicillin
Peck, P. A.: Agglutinating substances for homologous coliform organisms; observations on their occurrence in serum and feces of infants, *717
Pediatric societies, directory of, 625
Pediatrics: See also Children; Hospitals; Newborn Infants; and under names of specific diseases
brief report on sampling of certain opinions of local pediatricians, 815
diagnostic value of elementary electromyography in, 804
penicillin in, 808, 956
recent progress in, 624
responsibility of pediatrician in orthodontic problem, 623
significance of vitamin K in; latent hypoprothrombinemia in healthy children, 925
Pelvis: See also Genitals
prenatal estimation of birth weight by pelvicephalometry, 928
Pemphigus, Congenital: See Epidermolysis bullosa
Neonatorum: See Impetigo
successful treatment with penicillin; report of case, 621
Penicillin; comparative effect of penicillin and sulfonamide drugs on immune response of rabbits to pneumococcus infection and relation of immunity to bacterial chemotherapy, 288
complications of intrathecal use of, 291
effect of caronamide on penicillin therapy of experimental pneumococcus and typhoid infections in mice, 775
in pediatrics, 808, 956
maintenance of therapeutic blood concentrations of penicillin for 24 hours following single injections of penicillin-beeswax-peanut oil mixtures, 294
sterile abscess in both buttocks secondary to injection of penicillin in sesame oil, *387
Therapy: See also Anthrax; Diphtheria; Empyema; Gonorrhea; Meningitis; Ophthalmia neonatorum; Otitis Media; Pemphigus; Psittacosis; Septicemia; Syphilis; Wounds; etc.
therapy, toxic reactions accompanying, 956
therapy, tuberculous abscess formation following, 789
transfer into spinal fluid following parenteral administration, 129
Pericarditis, Rheumatic: See Rheumatic Fever
Perinephritis with and without operation, 457
Periodicals; transactions of Fifth International Pediatric Congress, 466
Periosteum, Dysplasia: See Bones, fragility
Peritoneum, irrigation; method of treatment of acute renal failure in infant, *237
primary enterogenic tuberculous peritonitis, 950
Peritonitis: See also Appendicitis
intraperitoneal administration of succinylsulfathiazole and phthalysulfathiazole, 793
Tuberculous: See under Peritoneum
Permoflux; group pure tone hearing test, 460
Perspiration, Insensible: See Metabolism
Pertussis: See Whooping Cough
Petrolatum, liquid; effect of ingested mineral oil in plasma carotene and vitamin A, 451
Pfeiffer's Bacillus: See Influenza
Phakoma; unpigmented primary tumor of optic disk, 619
Phalangitis: See Fingers and Toes
Phonation: See Speech
Phonetics: See Speech
Phosphate: See Phosphorus and Phosphorus Compounds
Phosphorus and Phosphorus Compounds; calcium and phosphate balances after administration of pure calcium salts and pulverized whole bone, 777
calcium enriched meat compared with milk as a source of calcium, phosphorus and protein, 282
nicotinamide and phosphorus in blood, 452
Radioactive: See Radioactivity
Phthalylsulfathiazole: See Sulfonamides
Phthisis: See Tuberculosis, pulmonary
Physical Education: See Exercise
Pierce, M.: Treatment of leukemia in children, 137
Pinelli, R. W.: Urinary glycocyamine, creatin and creatinine; their excretion in children with nephrotic syndrome, *67
Pink Disease: See Acrodynia
Pinworms: See Oxyuriasis
Pirone, P. P.: Accelerated production of poliomyelitis, *1
Pirquet Test: See Tuberculosis
Pituitary Body: See also Hypothalamus
Diseases: See also Laurence-Moon-Biedl Syndrome; etc.
diseases; dwarfism in healthy children; its possible relation to emotional, nutritional and endocrine disturbances, 776
pituitary-adrenal cortical control of lymphocyte structure and function as revealed by experimental x-radiation, 798
Placenta and mammary transfer of tocopherols (vitamin E) in sheep, goats and swine, 923
Plasma: See under Blood
Plasmalogen; distribution of Feulgen and 2,4-dinitrophenylhydrazine reactions in normal, castrated, adrenalectomized and hormonally treated rats (role of ketosteroids and plasmalogen), 799
Plasmodium: See Malaria
Play diagnosis, 953
therapy, 953
Pleura, Abscess: See Empyema
Effusion: See Pleurisy
Pleurisy, mediastinal, 127
spontaneous pleural effusion in newborn infant, *569
Pneumococci: See also under Pneumonia
comparative effect of penicillin and sulfonamide drugs on immune response of rabbits to pneumococcus infection and relation of immunity to bacterial chemotherapy, 288

Pneumococci—Continued
effect of caronamide on penicillin therapy of experimental pneumococcus and typhoid infections in mice, 775
pneumococcal empyema treated with penicillin, 612
pneumococcic meningitis successfully treated with sulfonamide compounds and penicillin, 292
treatment of pneumococcic meningitis with combined penicillin and sulfonamide therapy, 951
Pneumomediastinum; fatal interstitial and mediastinal emphysema following accidental needle perforations of trachea during jugular venipuncture, *375
Pneumonia: See also Bronchopneumonia
acute primary atypical, treatment of, 792
acute respiratory disorders among newborn infants in obstetric nurseries; experience in New York city, 1940 to 1948, *883
primary atypical, experimental immunization with virus from, 792
treatment with massive doses of sulfamidothiazole in pneumonia, bronchopneumonia and bronchitis in children, 127
Tuberculosis: See Tuberculosis, pulmonary
unusual strain of Pseudomonas aeruginosa, *252
virus, epidemic in children, 127
virus, epidemic in school, 947
Pneumothorax: See also Tuberculosis
fatal interstitial and mediastinal emphysema following accidental needle perforations of trachea during jugular venipuncture, *375
Poisons and Poisoning: See under names of substances
Polioencephalitis: See Encephalitis
Poliomyelitis, accelerated production of, *1
acute anterior; spinal puncture in diagnosis of Heine-Medin disease, 933
and scurvy, 455
encephalitis and involvement of basal nuclei in, *561
epidemiology of, 934
histopathologic changes associated with human poliomyelitis, 454
meningoradiculitis and syndrome of Guillain-Barré and Strohl, 291
progressive bulbar paralysis and its relation to chronic poliomyelitis and amyotrophic lateral sclerosis, 935
service with National Foundation for Infantile Paralysis announced, 818
short courses in diagnosis and treatment of poliomyelitis patients announced, 279
Pollen: See Anaphylaxis and Allergy; Asthma
Polyarthritis: See Arthritis
Polycythemia vera; radioactive phosphorus as therapeutic agent; review of literature and analysis of results of treatment of 155 patients with various blood dyscrasias, lymphomas and other malignant neoplastic diseases, 294
Polydactyly: See also Laurence-Moon-Biedl Syndrome
hereditary syndrome: malformation of tongue and polydactyly, 928
Polyhydramnios: See Amnion, dropsy of
Polyradiculoneuritis: See Guillain-Barré Syndrome
Population; demographic study of mortality due to prematurity and congenital weakness in Buenos Aires, Argentina, 1937 to 1941, 783
Pork: See also Meat
effect of cooking and curing on lysine content of pork luncheon meat, 281
Porphyrinuria: See under Urine
Postgraduate Course: See Education
Precocity: See Puberty
Pregnancy: See also Fetus; Labor; Maternity; Obstetrics; Puerperium
anticipatory guidance of pregnant woman and her husband for their roles as parents, 465
care of toxic newborn, 784
congenital anomalies following maternal rubella, *334
Pregnancy—Continued
effect of diet on fetal development, 922
effect of pregnancy complicated by alloxan diabetes on fetuses of dogs, rabbits and rats, 284
Hygiene: See Maternity welfare
leukocytic formula in newborn in relation to that in mother and endocrinology of gestation, 286
Multiple: See Twins
reproductive histories of mothers of 322 infants with erythroblastosis, 784
rubella as cause of congenital malformations, *914
thrombopenic purpura in newborn; review of literature and report of 6 cases, *401
Premature Infants, 121, 782
administration of vitamin E as preventive measure, 928
demographic study of mortality due to prematurity and congenital weakness in Buenos Aires, Argentina, 1937 to 1941, 783
influence of postnatal age on kidney function of, 782
prematurity—orientation, 452
prothrombin studies on blood of premature infant and value of vitamin K therapy, *686
Presentation: See Labor
Pressure required to produce intradermal wheals in normal human subjects, 622
Price, W. C.: Hypertrophy of colliculus seminalis in childhood; report of 18 cases, *892
Prolapse: See Rectum
Protamine Insulin: See under Diabetes Mellitus; Insulin
Proteins: See also Amino Acids; Enzymes; and under names of proteins, as Albumin; Casein; etc.
and amino acid therapy, 923
calcium enriched meat compared with milk as source of calcium phosphorus and protein, 282
comparative nutritive value of casein and lactalbumin for man, 282
in Blood: See Blood, proteins
in cereal grains, relative biologic values of, 922
study of relation between protein efficiency and gain in weight on diets of constant protein content, 282
Prothrombin: See Blood, prothrombin
Protozoa: See Leishmaniasis; Malaria; etc.
Pseudoinhibition as result of parallergic reaction in measles, 455
Pseudomonas Aeruginosa: See Bacteria, pyocyaneus
Psittacosis, laboratory infection with psittacosis virus treated with penicillin and sulfadiazine and experimental data bearing on mode of infection, 288
Psychiatry: See also Psychoanalysis; Psychology; Psychotherapy; etc.
grant approved for trainee in, 604
Psychoanalysis: See also Psychotherapy
play diagnosis, 953
psychoanalytic study of ulcerative colitis in children, 128
Psychology: See also Mental Tests; etc.
great psychologic effects of minor speech defect, 951
psychologic appraisal of children with neurologic defects, 796
Psychomotor Attacks: See Epilepsy
Psychoses: See Nervous and Mental Disabilities; etc.
Psychotherapy: See also Psychoanalysis
nocturnal enuresis, 132
play therapy, 953
Pubertas Praecox: See Puberty
Puberty: See also Adolescence
height and weight in relation to onset in boys, 779
precocious; 6 examples of precocious sexual development; studies in diagnosis and pathogenesis, *484

Pubic Bone; acute primary hematogenous osteomyelitis of os pubis, treated and cured with penicillin, 800
Public Health: See Child Welfare; Hygiene and Sanitation; etc.
Puericulture: See Child Welfare; Infant Welfare
Puerperium: See also Labor; Lactation; Pregnancy
physical requirements of rooming-in plan, 929
Pulse: See Arrhythmia
Purpura necrotica, 802
thrombopenic, in newborn; review of literature and report of 6 cases, *401
Pyelonephritis; peritoneal irrigation; method of treatment of acute renal failure in infant, *237
Pylorus; congenital hypertrophic stenosis, 794
congenital stenosis, incidence of, 128
Pyocolpos: See under Vagina
Pyoderma: See also Impetigo; etc.
infant and childhood morbidity in Salzburg following war, 284
Pyrexia: See Fever
Pyridoxine; anemia of infection; uptake of radioactive iron in iron-deficient and in pyridoxine-deficient pigs before and after acute inflammation, 943
Pyruvic Acid: See Acid, pyruvic
Pyuria: See Urinary Tract, infections

Quilligan, J. J., Jr.: Reactions to influenza virus vaccine in infants and children, *295
Quinine: See Anus; Rectum

Rabe, E. F.: Agglutinating substances for homologous coliform organisms; observations on their occurrence in serum and feces of infants, *717
Rabies; medical progress; active immunization, 287
Races: See also Blood, groups; Negroes; etc.
relationship between maternal ancestry and incidence of cleft palate, 285
Rachitis: See Rickets
Radiations: See Radium; Roentgen Rays; and under names of various diseases
Radiculomeningomyelitis: See Guillain-Barré Syndrome
Radioactivity; anemia of infection; uptake of radioactive iron in iron-deficient and in pyridoxine-deficient pigs before and after acute inflammation, 943
radioactive phosphorus as therapeutic agent; review of literature and analysis of results of treatment of 155 patients with various blood dyscrasias, lymphomas and other malignant neoplastic diseases, 294
Radium; underdevelopment of mandible as side effect of irradiation therapy, 927
Radius, Epiphyses: See Epiphyses
Radwin, L. S.: End results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
Ragweed: See Asthma
Ramond-Still-Chauffard Disease: See under Arthritis
Rapoport, S.: Hypocalcemia in neonatal period; clinical study, *537
Rations; reproduction and lactation studies with rats fed natural and purified rations, 922
Reading and arithmetic abilities associated with speech defects, 465
study of certain factors presumed to be associated with reading and speech difficulties, 952
Rectum; external anorectal prolapse in children during war years, *671
giardiasis associated with recurrent rectal hemorrhages, 938
Redox: See Blood, reducing properties
Reed, S. C.: Fibrosis of pancreas in infants and children; statistical study of clinical and hereditary features, *349
Reflex; effects of cup, bottle and breast feeding on oral activities of newborn infants, 928
light reflexes associated with spherophakia, 620
Reproduction: See also Pregnancy
and lactation studies with rats fed natural and purified rations, 922
reproductive histories of mothers of 322 infants with erythroblastosis, 784
Research professorship to S. S. Stevenson, 818
Respiration; anoxia of central nervous system and congenital heart disease; report of 3 cases with note on history of asphyxia, *28
Disorders: See Asphyxia
of premature infant, 782
rationale of blowing exercises for patients with repaired cleft palates, 452
velopharyngeal exercise, 285
Respiratory Quotient: See Metabolism
Respiratory Tract: See also Bronchi; etc.
Diseases: See also Bronchitis; Pneumonia; etc.
diseases; acute respiratory disorders among newborn infants in obstetric nurseries: experience in New York city, 1940 to 1948, *883
foreign bodies in, 610
laryngeal diphtheria and other infections, 122
Resuscitation: See under Asphyxia
Reticuloendothelial System: See also Anemia, splenic; Jaundice; Liver; etc.
function before and after birth, 609
Retina: See also Macula Lutea
neuroblastoma of, 802
Retinitis; genetic relationships between spinal hereditary sclerosis (Friedreich's ataxia) and various forms of tapetoretinal degeneration, 614
Rh Factor: See Blood, groups; Blood, transfusion
Rheumatic Fever: See also Rheumatism
acute, effect of para-aminobenzoic acid on fever and joint pains of, 937
Bouillaud's disease (acute rheumatic fever) in small children, 787
cardiac enlargement in uncomplicated mitral insufficiency in children, *703
chorea (Sydenham); study of 58 additional patients, *306
electrocardiogram in diagnosis and management of, 123
importance of continuous or recidivating activity in, 933
production of acute rheumatic-like heart lesions in mice, 937
size of heart during, 788
Rheumatism: See also Arthritis
Acute Articular: See Rheumatic Fever
palindromic, 954
Rhinitis: See also Respiratory Tract, diseases
unusual strain of Pseudomonas aeruginosa, *252
Riboflavin: See also Vitamins, B
availability of vitamins from yeasts; availability to human subjects of riboflavin from fresh and dried bakers' yeasts varying in viability, 450
Richmond, J.: Mandibular growth disturbance in rheumatoid arthritis of childhood, *728
Rickets: See also Vitamins, D
Celiac: See Celiac Disease
congenital, 778
cumulative effect of sunlight as compared with seasonal variation of rickets and tetany, 925
increased incidence in dystrophic children, 925
phosphatemia and clinical signs of; their relation to massive doses of vitamin D, 283
Renal: See Dwarfism
roentgen diagnosis, associated with other skeletal diseases of infants and children, 924
vitamin D_2 intoxication, 120

Roberts, M. H.: Multiple calcareous deposits in intestinal tract of newborn; report of case associated with stenosis of ileum, *393
Roentgen Rays; pituitary-adrenal cortical control of lymphocyte structure and function as revealed by experimental x-radiation, 798
Roentgenology, continuation course in pediatric roentgenology, 604
Rosen, A. P.: Postvaccination encephalitis; problem in differential diagnosis, *248
Rosenblum, P.: Chorea (Sydenham); study of 58 additional patients, *306
Rosner, D.: Chorea (Sydenham); study of 58 additional patients, *306
Rosner, D. C.: Epidermolysis bullosa, *708
Ross, L. J.: Arachnodactyly; review of recent literature and report of case with cleft palate, *417
Roundworms: See Oxyuriasis
Rubella as cause of congenital malformations, *914
  maternal, congenital anomalies following, *334
  rubella-deafened infants; comparison of group of rubella-deafened children with group of hereditarily deaf children and their sibs, *182

St. Vitus' Dance: See Chorea
Salicyl Compounds; acute acetylsalicylic acid intoxication; report of 5 cases with 2 deaths, *477
  in vitro effect of streptomycin and para-aminosalicylic acid (PAS) on growth of tubercle bacilli, 940
Saliva; Zambrini's ptyaloreaction in school children, 927
Sanford, H. N.: Action of intravenous injections of histamine on blood of hemophilic children, 139
  Prothrombin studies on blood of premature infants and value of vitamin K therapy, *686
  Report of Joint Maternal Welfare Committee of Cook County, 134
Sanford, M. C.: Stimulation of mandibular growth in congenital micrognathia by traction, *750
Sanitation: See Hygiene and Sanitation
Sarcoma: See Cancer; Lymphosarcoma; Tumors; and under names of organs and regions, as Kidneys; etc.
Sartwell, M. K. L.: Encephalitis and involvement of basal nuclei in poliomyelitis, *561
Sawchuk, S.: Measles encephalitis; study of 50 cases, *844
Scarlatina: See Scarlet Fever
Scarlet Fever, 287. See also Streptococci and eosinophilia, 606
  complications and risk of infection, 936
  diagnostic value of Dick test, white blood cell counts, throat cultures and desquamation, *314
  Dick test in military personnel, 286
  treatment with human immune globulin, *437
Scherl, S.: Spontaneous pleural effusion in newborn infant, *569
Schick Test: See Diphtheria
Schizophrenia: See Dementia Precox
Schless, R. A.: Acute acetylsalicylic acid intoxication; report of 5 cases with 2 deaths, *477
Schmitz's Bacillus: See Dysentery
Schoenlein-Henoch's Purpura: See Purpura
Schools; age variation of predisposition to tuberculosis, 941
  elementary, efficacy of speech reeducation of functional articulatory defectives in, 611
  epidemic of virus pneumonia in, 947
  hygiene organization in Sweden, 927
  outbreak of influenza A in boys' school, 607
  Zambrini's ptyaloreaction in school children, 927
Schultz, A.: Streptomycin in treatment of whooping cough, 810
Sclerosis, hereditary, 613
  progressive bulbar paralysis and its relation to chronic poliomyelitis and amyotrophic lateral sclerosis, 935
Scoliosis: See Spine, curvature
Scorbutus: See Scurvy
Scott, E. P.: Cyanosis caused by methemoglobinemia, *77
Scott, W. W.: Six examples of precocious sexual development; studies in diagnosis and pathogenesis, *484
Scrofula: See Tuberculosis
Scurvy: See also Ascorbic Acid
  and poliomyelitis, 455
  in infants, 119
  roentgen diagnosis of rickets associated with other skeletal diseases of infants and children, 924
  subperiosteal hematoma in Moeller-Barlow disease, 283
Seasons; cause and significance of seasonal variation in hemorrhagic tendency in newborn, 931
  cumulative effect of sunlight as compared with seasonal variation of rickets and tetany, 925
Seckel, H. P. G.: Six examples of precocious sexual development; studies in diagnosis and pathogenesis, *484
Secretions, Internal: See Endocrine Glands
Seminal Vesicles; hypertrophy of colliculus seminalis in childhood; report of 18 cases, *892
Sensitization: See under Anaphylaxis and Allergy; Immunity; etc.
Sepsis: See Septicemia
Septicemia: See also Infection; and under names of organisms and diseases, as Staphylococci; Streptococci; etc.
  of newborn, 931
  penicillin in treatment of neonatal sepsis, 122
Septum, Interventricular: See Heart
Serum: See Blood
  Hypersensitiveness: See Anaphylaxis and Allergy
  Sickness: See Anaphylaxis and Allergy
  Transfusion: See Blood, transfusion
Sesame Oil, sterile abscess in both buttocks secondary to injection of penicillin in, *387
Sex differences in relation to stuttering, 460
  Hormones: See Hormones
  Intergrades: See under Hermaphroditism
  Precocious Development: See under Puberty
  supplement to theory of latency period in sexual development, 797
Shanks, R. A.: Nature of infantile convulsions, *763
Shepard, K. S.: Further studies on use of streptomycin in treatment of whooping cough, *212
Shields, J. J.: Spread of diarrhea of unknown origin in ward for infants, *217
Shigella: See Bacteria; Dysentery
Shock, Anaphylactic: See Anaphylaxis and Allergy
  Emotional: See Emotions
Shwachman, H.: Morphologic characteristics and antibiotic resistance of Hemophilus influenzae, *659
Silver, F. F.: Treatment of scarlet fever with human immune globulin, *437
Silverstein, A.: Measles encephalitis; study of 50 cases, *844
Sinus, Maxillary: See Maxillary Sinus
Skeleton: See Bones
Skin, abnormalities; Ehlers-Danlos syndrome; 2 cases, 622
  Blood Supply: See Capillaries
  congenital ulcer of skin and bone of skull (Ombrédanne's disease), 453
  Diseases: See under names of diseases, as Herpes; etc.
  Hemorrhage: See Purpura
  Inflammation: See Dermatitis

Skin—Continued
primary cutaneous tuberculosis, 608
reactions; pressures required to produce intradermal wheals in normal human subjects, 622
Skull: See Cranium
Sleep and enuresis, 292
Sleeping Sickness: See Encephalitis
Smallpox; effect of nicotinic acid on vaccination, 123
medical progress; active immunization, 287
postvaccination encephalitis; problem in differential diagnosis, *248
Snartemo, R.: Prophylaxis of whooping cough, *677
Sobel, A. E.: Vitamin A absorption in newborn, date of receipt of paper, 280
Social Conditions; end results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
socioemotional factors accounting for growth failure in children living in institution, 780
Societies, foreign, directory of, 625
Indiana State Pediatric Society, fall meeting announced, 604
international, directory of, 625
local, directory of, 631
Long Beach (Calif.) Pediatric Society, 917
national, directory of, 628
pediatric, directory of, 625
sectional, directory of, 629
Sixth International Congress of Pediatrics, Zurich, Switzerland, 1950, 279
state, directory of, 629
transactions of Fifth International Pediatric Congress, 466

Society Transactions:

Chicago Pediatric Society, 134, 805

Sodium Nitrite: See Nitrites and Nitrite Derivatives
Salicylate: See Rheumatic Fever; Salicyl Compounds
Spasm: See Chorea; Convulsions; Epilepsy; Muscles; etc.
Speech defects associated with reading and arithmetic abilities, 465
defects; great psychologic effects of minor speech defect, 951
defects; sex differences in relation to stuttering, 460
efficacy of speech reeducation of functional articulatory defectives in elementary schools, 611
environmental factors in relation to speech of cerebral palsied children, 952
infant; variability and problem of diagnosis, 610
place of New York city in American linguistic geography, 611
reeducation in Virginia, new state program, 283
spontaneous versus imitated verbalization in testing articulation in preschool children, 611
study of certain factors presumed to be associated with reading and speech difficulties, 952
Spherophakia: See Lens, Crystalline
Spinal Cord: See Meninges; Nervous System; etc.
Spinal Fluid: See Cerebrospinal Fluid
Spinal Puncture: See also Cerebrospinal Fluid in diagnosis of acute anterior poliomyelitis (Heine-Medin disease), 933
Spine, curvature; kyphosis in tetanus, 938
myeloplaxoma of cervical vertebrae in 2½ year old child treated by roentgen therapy, 800
Spirochaeta Pallida: See Syphilis
Spleen, Hypertrophy: See Splenomegaly
Splenectomy, aplastic anemias in childhood; report of primary idiopathic refractory type with splenectomy, in 11 year old girl, *516
Splenomegaly: See also Anemia, splenic
with profuse bleeding into gastrointestinal tract, 943
Spongioblastoma of optic chiasm in infant, 801
Spotted Fever: See Meningitis
Sprue, Nontropical: See Celiac Disease
Sputum, use of Dubos medium for culture of M. tuberculosis from, 790
Stains and Staining; distribution of Feulgen and 2,4-dinitrophenylhydrazine reactions in normal, castrated, adrenalectomized and hormonally treated rats, 799
Staphylococci; acute respiratory disorders among newborn infants in obstetric nurseries; experience in New York city, 1940 to 1948, *883
bacteriologic and epidemiologic studies on pemphigus neonatorum and its treatment, 786
significance of positive blood cultures in newborn infants, 783
Status Asthmaticus: See Asthma
Epilepticus: See Epilepsy
Steatorrhea: See Celiac Disease
Steeple Skull: See Acrocephaly
Stem, J. M.: Unusual strain of Pseudomonas aeruginosa, *252
Stenosis: See Arteries pulmonary; Pylorus; etc.
Sterilization, Sexual: See Castration
Sternum Puncture: See Bones, marrow
Steroids: See also Hormones
distribution of Feulgen and 2,4-dinitrophenylhydrazine reactions in normal, castrated, adrenalectomized and hormonally treated rats (role of ketosteroids and plasmalogen), 799
Stevenson, S. S., given research professorship, 818
Stilbestrol: See Estrogens
Still's Disease: See Arthritis
Stillbirths: See Infant Mortality
Stokes-Adams Disease: See Heart, block
Stomach: See also Gastrointestinal Tract; Pylorus; etc.
fat digestion and gastric evacuation, 128
value of biopsy of liver in nutritional dystrophy; evaluation of treatment with choline and dried stomach, *141
Stomatitis; diphtheritic gingivitis and stomatitis, 936, 937
ulcerative; acute respiratory disorders among newborn infants in obstetric nurseries; experience in New York city, 1940 to 1948, *883
unusual strain of Pseudomonas aeruginosa, *252
Stones: See Kidneys; Ureters; etc.
Stools: See Feces
Strabismus, surgical treatment of, 618
Stransky, E.: Heredity in infantile type of Gaucher's disease; report of case, *694
Strenge, H. B.: Unusual strain of Pseudomonas aeruginosa, *252
Streptococci: See also Scarlet Fever
acute respiratory disorders among newborn infants in obstetric nurseries; experience in New York city, 1940 to 1848, *883
antitoxin; treatment of scarlet fever with human immune globulin, *437
scarlet fever; diagnostic value of Dick test, white blood cell counts, throat cultures and desquamation, *314
treatment of subacute bacterial endocarditis with penicillin in peanut oil and beeswax, 290
Streptomycin; clinical administration of dihydrostreptomycin in tuberculosis, 939
in vitro effect of streptomycin and para-aminosalicylic acid (PAS) on growth of tubercle bacilli, 940
laboratory and clinical investigation of dihydrostreptomycin, 939
Therapy: See Meninges, tuberculosis; Meningitis; Tuberculosis; Whooping Cough; etc.
Strohl-Guillain-Barré Syndrome: See Guillain-Barré Syndrome
Stuttering: See Speech, defects

Subdural Space: See Meninges
Succinonitrile; accelerated production of poliomyelitis, *1
Succinoxidase: See Oxidase and Peroxidase
Succinylsulfathiazole: See Sulfonamides
Suffocation: See Asphyxia
Sugars, in Blood: See Blood, sugar
in Urine: See Diabetes Mellitus
Sulfadiazine: See Meningitis; Psittacosis; Sulfonamides; etc.
Sulfamidothiazole: See Bronchitis
Sulfhydryl Compounds; development and use of BAL; review with reference to arsenical dermatitis, 804
Sulfonamides: allergic nature of erythema nodosum produced by sulfathiazole, 803
comparative effect of penicillin and sulfonamide drugs on immune response of rabbits to pneumococcus infection and relation of immunity to bacterial chemotherapy, 288
effect of caronamide on penicillin therapy of experimental pneumococcus and typhoid infections in mice, 775
intraperitoneal administration of succinylsulfathiazole and phthalylsulfathiazole, 793
Therapy: See Meninges, tuberculosis; Meningitis; Otitis Media; Urinary Tract, infections; etc.
Sunlight: See Light
Suprarenals: See Adrenals
Surface Tension: See under Milk
Surgery: See Apparatus; Wounds
Sweat; cold sweating, hypoglycemia and carbohydrate insufficiency, 802
Swift-Selter-Feer Disease: See Acrodynia
Syphilis: See also under names of organs and regions
congenital, 789
early congenital; treatment of 252 patients with penicillin, 457
Hereditary: See Syphilis, congenital
osteomyelitis simulating syphilitic osteochondritis, 617
prenatal (congenital), 941
syphilitic dactylitis, 609
tertiary; third generation syphilis, 941

Tachycardia: See Arrhythmia
Takacs, W. S.: Accelerated production of poliomyelitis, *1
Takata-Ara Test: See Blood, proteins
Tandeta, M.: Phenylpyruvic oligophrenia; 2 cases of siblings, *759
Tantalum; stimulation of mandibular growth in congenital micrognathia by traction, *750
Teaching: See Education
Teeth; dental fluorosis, 623
responsibility of pediatrician in orthodontic problem, 623
toxic level of fluorine in water supplies, *72
underdevelopment of mandible as side effect of irradiation therapy, 927
Temperature: See Cold; Fever; Heat; etc.
Temporomaxillary Joint: See Jaws
Teratoma; anatomic study of complex retrobulbar embryonic malformation, 619
Testes, undescended; 2 forms of cryptorchism, 456
Tetanus, kyphosis in, 938
otogenous, case of, 124
severe, treatment of case of, 788
Tetany: See also Blood, calcium; Calcium and Calcium Compounds
cumulative effect of sunlight as compared with seasonal variation of rickets and tetany, 925
hypocalcemia in causation of infantile convulsions, *768
hypocalcemia in neonatal period; clinical study, *537
vitamin D_2 intoxication, 120
Tetralogy of Eisenmenger: See Heart, abnormalities
Thaysen-Gee Disease: See Celiac Disease
Thiamine: See also Beriberi; Vitamins, B
availability of vitamins from yeasts; influence of ingestion of fresh and dried bakers' yeast varying in viability and in thiamine content on availability of thiamine to human subjects, 451
does thiamine pyrophosphate (cocarboxylase) occur in urine? 926
Thiersch Ring: See Anus; Rectum
Thiocyanates; volume of extracellular body fluids in malnutrition, 924
Thiouracil: See Thiourea
Thiourea; effect of thiouracil on succinoxidase and cytochrome oxidase of rat liver, 616
Thorax: See Heart; Lungs; Mediastinum; etc.
Throat: See also Larynx; etc.
scarlet fever; diagnostic value of Dick test, white blood cell counts, throat cultures and desquamation, *314
Thrombocytosis: See Purpura
Thrombopenia: See under Diathesis, hemorrhagic; Purpura
Thumb: See Fingers and Toes
Thymoma, 133
Thymus; thymoma, 133
Thyroid; effect of thyroid hormone and iodine on carotenoids of blood, 120
end results in treatment of congenital hypothyroidism; follow-up study of physical, mental and behavioral development, *821
Ticks: See Encephalitis
Tinea capitis due to Microsporon audouini; methods of local therapy, 620
capitis; treatment with special iodine and dilute acetic acid, 621
Tissue; invasion by Shigella sonnei of tissues of mice following gavage with viable Shigella, 775
Staining: See Stains and Staining
Tocopherols: See Vitamins, E
Toes: See Fingers and Toes
Toilet training; brief report on sampling of certain opinions of local pediatricians, 815
Tongue; hereditary syndrome: malformation of tongue and polydactyly, 928
de Toni-Fanconi Syndrome: See Dwarfism, renal
Tonsillectomy during convalescence from diphtheria, 935
infection of neck after, 944
massive atelectasis following tonsillectomy under local anesthesia; report of case, 610
Toomey, J. A.: Accelerated production of poliomyelitis, *1
Antipertussis serum (animal), *320
Encephalitis and involvement of basal nuclei in poliomyelitis, *561
Tordoir, B. M.: External anorectal prolapse in children during war years, *671
Tornay, A.: Measles encephalitis; study of 50 cases, *844
Tower Skull: See Acrocephaly
Toxemia; care of toxic newborn, 784
Toxicology: See under names of poisonous substances
Toxin and Antitoxin: See Scarlet Fever; etc.
Toxoid: See Diphtheria; Tetanus; etc.
Toxoplasmosis in children, 940
Trachea: fatal interstitial and mediastinal emphysema following accidental needle perforations of trachea during jugular venipuncture, *375
Traction, stimulation of mandibular growth in congenital micrognathia by, *750
Transfusion: See Blood, transfusion
Treponema: See Syphilis
Tricuspid Valve; tricuspid atresia; report of 2 cases of young infants, with successful operation, *16
Tropical Medicine: See under names of tropical diseases, as Leishmaniasis; etc.
Truancy: See under Schools
Tuber Cinereum: See Hypothalamus

Tubercle Bacilli: See also Sputum; Tuberculosis
in vitro effect of streptomycin and para-aminosalicylic acid (PAS) on growth of, 940
Tuberculin: See Tuberculosis
Tuberculosis: See also Tubercle Bacilli; and under names of organs and regions, as Meninges; Peritoneum; etc.
age variation of predisposition to, 941
allergic nature of erythema nodosum produced by sulfathiazole, 803
BCG vaccination, 280
BCG vaccination in Scandinavia; 20 years of uninterrupted vaccination against tuberculosis, 788
BCG vaccination in Sweden, 608
BCG vaccination of newborn infants, 941
cervical adenitis in infants vaccinated at birth with BCG, 125
clinical administration of dihydrostreptomycin in, 939
influence of war conditions on bovine tuberculosis in Amsterdam, 942
laboratory and clinical investigation of dihydrostreptomycin, 939
primary cutaneous, 608
pseudoreactions to tuberculin patch test, *302
pulmonary; streptomycin used in treatment in children, 805
rapid mouse test for laboratory diagnosis of, 940
serum calcium and blood inorganic phosphorus levels after massive therapy with vitamin D_2 in children with, 790
tuberculous abscess formation following penicillin therapy, 789
use of Dubos medium for culture of M. tuberculosis from sputum, 790
value of juvenile Mantoux reaction in discovery of unsuspected adult tuberculosis, 124
Tumors: See also Epithelioma; Granuloma; Hemangioendothelioma; Hematoma; Leiomyoma; Lymphoma; Myeloplaxoma; Neuroblastoma; Spongioblastoma; Thymoma; etc.; and under names of organs and regions, as Brain; Ovary; etc.
dermoid; anatomic study of complex retrobulbar embryonic malformation, 619
nitrogen mustard therapy; studies on effect of methyl-bis (beta-choroethyl) amine hydrochloride on neoplastic diseases and allied disorders of hemopoietic system, 956
nitrogen mustards in treatment of neoplastic disease; official statement, 955
Wilms's: See Kidneys
Twins; mongolism in 1 of twins and in another sibling; report of case, *573
Typhoid; effect of caronamide on penicillin therapy of experimental pneumococcus and typhoid infections in mice, 775
esophageal stricture following, 938
in vaccinated laboratory workers, 289
infection in children, 938
masked by measles; perforation of intestine with recovery, *744

Ulcers: See also under names of organs and regions
congenital, of skin and bone of skull (Ombrédanne's disease), 453
Typhoid masked by measles; perforation of intestine with recovery, *744
Undergraduate Teaching: See Education
Urea Hydrochloride: See Anus; Rectum
Ureters: See also Urinary Tract
calculi; giant ureteral stone in 3 year old child, 797
Urinary Tract: See also Genitals; Kidneys; Ureters; etc.
infections; treatment of pyuria in infancy with sulfonamide drugs, 798
Urination; brief report on sampling of certain opinions of local pediatricians (toilet training), 815
Urination—Continued
incontinence; clinical forms of enuresis, 954
incontinence; enuresis and sleep, 292
incontinence; nocturnal enuresis, 132
Urine: See also Urination; and under names of diseases
condition resembling porphyrinuria, 132
does thiamine pyrophosphate (cocarboxylase) occur in, 926
metabolism of women during reproductive cycle; vitamin C in diets, breast milk, blood and urine of nursing mothers, 450
phenylpyruvic oligophrenia; 2 cases of siblings, *759
renal threshold for ascorbic acid; modified method for its estimation with results for 12 adult subjects, 449
urinary glycocyamine, creatine and creatinine; their excretion in children with nephrotic syndrome, *67

Vaccination: See Immunity; Smallpox
Vaccine, Calmette-Guérin: See Tuberculosis
reactions to influenza virus vaccine in infants and children, *295
Vaccinia: See Smallpox
Vagina; pyocolpos in infancy, 128
Vagotomy: See Nerves, vagus
Variola: See Smallpox
Vasomotor System: See Arteries; Capillaries; Nervous System; Veins
Vass, A.: Drainage of pulmonary veins into coronary sinus, *906
Véghelyi, P. V.: Avitaminosis A in giardiasis, *257
Veins, jugular; fatal interstitial and mediastinal emphysema following accidental needle perforations of trachea during jugular venipuncture, *375
pulmonary, drainage into coronary sinus, *906
umbilical, transfusions in newborn infants through abdominal wall segment of, 783
Velum: See Palate
Venereal Diseases: See Gonorrhea; Neurosyphilis; Syphilis
Vertebrae: See Spine
Verumontanum; hypertrophy of colliculus seminalis in childhood; report of 18 cases, *892
Vestibular Apparatus: See Ear
Viruses: See also Encephalitis; Herpes; Pneumonia; etc.
viral studies on etiology of epidemic diarrhea of newborn, 794
Viscera: See also Abdomen; Pelvis; and under names of viscera
bone marrow in visceral leishmaniasis in children, 124
disseminated visceral lesions associated with extreme eosinophilia; pathologic and clinical observations on syndrome of young children, *153
Vision: See Eyes; etc.
Vital Statistics: See also Infant Mortality
influence of war in community of Sienna, 120
Vitamins: See also Ascorbic Acid; Folic Acid; Nicotinic Acid; Pyridoxine; Riboflavin; Thiamine
A absorption in newborn, date of receipt of paper, 280
A; avitaminosis A in giardiasis, *257
A; effect of ingested mineral oil in plasma carotene and vitamin A, 451
A; influence of hypervitaminosis A on bone growth, 778
A; treatment of tuberculous meningitis with streptomycin, sulfones and vitamin A, 457
B: See also Nicotinic Acid; Folic Acid; Pyridoxine; Riboflavin; Thiamine
B deficiency, Wernicke's syndrome due to; report of disease in 2 infants, *88

Vitamins—Continued
B; improving nutritive value of flour; effect of supplementing enriched flour with other B complex vitamins, 281
B: See Thiamine
B_2: See Riboflavin
C: See Ascorbic Acid
D: See also Rickets
D; histologic effect of massive single doses in nonviable infants, 925
D; phosphatemia and clinical signs of rickets; their relation to massive doses of vitamin D, 283
D poisoning, 926
D; serum calcium and blood inorganic phosphorus levels after massive therapy with vitamin D_2 in children with tuberculosis, 790
D_2 intoxication, 120
Deficiency: See under names of deficiency diseases, as Beriberi; Rickets; Scurvy; and under specific vitamins; etc.
E: See also Pregnancy; Reproduction
E; administration to premature infants as preventive measure, 928
E; effect of mixed tocopherols on milk and butterfat production of dairy cow, 923
E; placental and mammary transfer of tocopherols (vitamin E) in sheep, goats and swine, 923
K; prothrombin studies of blood of premature infant and value of vitamin K therapy, *686
K; significance in pediatrics; latent hypoprothrombinemia in healthy children, 925
K; thrombopenic purpura in newborn; review of literature and report of 6 cases, *401
metabolism of women during reproductive cycle; effect of multi-vitamin supplements on vitamin C utilization of nursing mothers, 450
research, recent results of, 119
therapy, introduction to, 451
Vitelline Duct; patent omphalomesenteric duct and its relation to diverticulum of Meckel, 794
Vocabulary: See under Speech
Vollmer, H.: Chronic emphysematous cavity of lung, *755
Histoplasmin patch test, *65
Pseudoreactions to tuberculin patch test, *302
Vomiting and infiltration of splanchnic nerves in infants, 949
Vowels: See Speech

Walcher, D. N.: Klebsiella pneumoniae associated with infantile diarrhea, *61
Wannamaker, L. W.: Streptomycin in treatment of whooping cough, *201
War: See also Military Medicine
external anorectal prolapse in children during war years, *671
increased incidence of rickets in dystrophic children, 925
infant and childhood morbidity in Salzburg following, 284
infantile beriberi in Singapore during latter part of Japanese occupation, 778
influence of war conditions on bovine tuberculosis in Amsterdam, 942
influence on vital statistics in community of Sienna, 120
Warkany, J.: Congenital anomalies following maternal rubella, *334
Warner, R.: Congenital anomalies following maternal rubella, *334
Mongolism in 1 of twins and in another sibling; report of case, *573
Warthen, R. O.: Phenylpyruvic oligophrenia; 2 cases of siblings, *759
Typhoid masked by measles; perforation of intestine with recovery, *744
Wassermann Reaction: See Syphilis
Water: See also Fluids
cyanosis caused by methemoglobinemia, *77
Water—Continued
Metabolism: See also Dehydration; Edema; Sweat
metabolism, abnormal, in malnutrition, 449
methemoglobinemia; 2 cases in infants, 125
supplies, toxic level of fluorine in, *72
Weaning: See Infant Feeding; Lactation
Wedum, B. G.: Cardiac enlargement in uncomplicated mitral insufficiency in children, *703
Weichsel, M.: Streptomycin in treatment of whooping cough, *201
Weight and height in relation to onset of puberty in boys, 779
comparison of weight of newborn infants 85 years ago and today, 606
study of relation between protein efficiency and gain in weight on diets of constant protein content, 282
Weinfeld, G. F.: Brief report on sampling of certain opinions of local pediatricians, 815
Weltmann Test: See Blood, proteins
Werdnig-Hoffmann Paralysis: See Atrophy, muscular
Wernicke's Syndrome: See Encephalitis, hemorrhagic
Wheals: See Skin, reactions
Wheat Germ Oil: See Vitamins, E
Whooping Cough; antipertussis serum (animal), *320
bacteriologic diagnosis in, 936
childhood behavior sequela of asphyxia in infancy with reference to pertussis and asphyxia neonatorum, 953
etiologic analysis of cases of "pertussis brain," 456
immunization with diphtheria toxoid and pertussis vaccine Sauer during epidemic of, 934
prophylaxis of, *677
streptomycin in treatment of, *201, *212, 810
vaccine, trial in city and residential nursery groups; report to Medical Research Council, 933
Williams, J. M.: Phenylpyruvic oligophrenia; 2 cases of siblings, *759
Wilms's Tumors: See Kidneys
Winter, W. D., Jr.: Morphologic characteristics and antibiotic resistance of Hemophilus influenzae, *659
Work performance, respiratory exchange and certain blood constituents after isocaloric meals of low and high carbohydrate content, 281
Worms: See Oxyuriasis; etc.
Wounds; penicillin and other antibiotics as chemotherapeutic agents in wound infections, 622

X-Rays: See Roentgen Rays

Yamaoka, Y.: Intracranial hemorrhage and aseptic purulent meningitis in newborn infants, *384
Yampolsky, J.: Present treatment of influenzal meningitis; review of literature and report on 22 patients treated with streptomycin and sulfadiazine, *97
Yeast: See also Vitamins
availability of vitamins from; availability to human subjects of riboflavin from fresh and dried bakers' yeasts varying in viability, 450
availability of vitamins from; influence of ingestion of fresh and dried bakers' yeasts varying in viability and in thiamine content on availability of thiamine to human subjects, 451

Zambrini's Reaction: See Saliva
Zeavin, I.: Nephrolithiasis with renal tubular failure, *389
Zona: See Herpes
Zuelzer, W. W.: Disseminated visceral lesions associated with extreme eosinophilia; pathologic and clinical observations on syndrome of young children, *153

MEDICAL LIBRARY

DEC 22 1949

VOLUME 78 NUMBER 6

AMERICAN JOURNAL

OF

DISEASES OF CHILDREN

EDITORIAL BOARD

CLIFFORD G. GRULEE, Chief Editor
Box 671, Evanston, Ill.

OSCAR M. SCHLOSS, New York
FRITZ B. TALBOT, Boston
A. A. WEECH, Cincinnati
H. F. HELMHOLZ, Rochester, Minn.
FRANCIS SCOTT SMYTH, San Francisco
JAMES L. WILSON, Ann Arbor, Mich.

DECEMBER 1949

PUBLISHED MONTHLY BY AMERICAN MEDICAL ASSOCIATION, 535 NORTH DEARBORN STREET, CHICAGO 10, ILLINOIS. ANNUAL SUBSCRIPTION, $10.00

Entered as Second Class Matter Jan. 4, 1911, at the Postoffice at Chicago, Under the Act of Congress of March 3, 1879

COPYRIGHT, 1949, BY THE AMERICAN MEDICAL ASSOCIATION